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ARCHIVES OF OTOLOGY.

HISTOLOGICAL CHANGES AFFECTING THE SOFT AND OSSEOUS STRUCTURES OF BOTH TEMPORAL BONES IN A CASE OF TERTIARY SYPHILIS.

By S. MOOS and H. STEINBRÜGGE, of Heidelberg.

Translated by Dr. Jefferson Bettman, Assistant Surgeon to the N. Y. Ophthalmic and Aural Institute.

(*With three illustrations on Plates iii. and iv.*)

THE authors are indebted to Privy Councillor Arnold for the pathological specimens, and to Dr. Gustav Waltz for the following clinical report:

"Christian Kustner, porter, later on, type-setter, at the time of the first observation aged thirty-seven years, was first treated in the Policlinic, June 19, 1867. At that period, he suffered from an extensive cutaneous ulceration, syphilitic in character, involving the lower portion of the right thigh. Admits having contracted a hard chancre a few years ago, which he claims to have cured with some popular nostrum. A year previous he had a skin eruption and an inflammatory throat affection (pain on swallowing and yawning). Besides the ulceration, he also suffered from general glandular swelling, faulty nutrition, and in consequence of violent pain in the affected limb, of insomnia. The treatment consisted of local applications of red precipitate ointment, subcutaneous injections of morphia at bedtime, and the use of the following pills:

℞ Hg. iodat. flav., ʒ i.
Ext. opii aquosi, gr. vi.
Ext. chamomill.,
Pulv. rad. altheæ, āā q. s.
M. ft. pilul. No. xl.

After the prolonged use of this treatment, the local lesion healed. Soon after, a syphilitic ozæna developed with subsequent destruction of the nose and hard palate. Destructive changes in the pharynx produced aural trouble, and besides suppurating bony tumors of the skull, the patient at various times also suffered from swelling of the epiphyses of the femur, with anchylosis at the knee, frequent osteocopic pain and premature senile marasmus. Iodide of potash, quinine, arsenic, iodide of iron, and opiates had but little effect in combating these various symptoms. After having been under observation for a period of seventeen years, during which he was regarded as a useless member of society, fit only for various therapeutic experiments, the patient died in the academic hospital."

During the first two years of his treatment under Dr. Waltz, his aural trouble was attended to by Dr. Moos. The naso-pharyngeal disease at that period was regarded as having run its course. The destruction of the bony framework of the nose facilitated inspection of the parts. It was readily seen that the faucial orifices of both Eustachian tubes were closed by numerous thick, radiating, fibrous bands so that the ventilation of the drum cavity must have been almost impossible. Notwithstanding, there never was a demonstrable deviation in the plane of the membrane, in the position of the handle of the hammer, or in the cone of light, and there was no unusual development of the posterior fold. Strange to say, the patient never complained of subjective noises nor of dizziness. Bone-conduction was always sufficiently preserved to detect the loud tick of a watch and the tuning-fork ; the capacity for hearing speech was, however, so much reduced that ordinary conversation was not heard beyond one metre. Treatment consisted in paracentesis of the membrane, repeated every six to eight weeks, extending over a period of several years. The object of this was not to give exit to exudations in the middle ear, a condition never present, but to favor the entrance of air into the cavity from the external canal. Great improvement always followed the operation, the capacity for speech of both ears being increased to six metres for a while, then it gradually decreased again till it reached its former low state.

After the paracentesis had been made probably two dozen times, the patient passed from under my observation, and it was only through the vigilance of Dr. Waltz that I learnt that the patient had been received in Prof. Erb's ward. The patient died

here on the 30th of March, 1884. Eight days prior to his demise Dr. Steinbrügge examined him, and found the following condition: Intractable syphilis, patient reduced to a mere skeleton, nose sunken and almost entirely destroyed, perforation and partial destruction of the soft and bony palate (obturator). The scalp was covered with large ulcerations, dusted over with iodoform, which, according to Dr. Ziehl, were the result of caries and necrosis of the bones of the skull.

Patient is now only able to hear words spoken in close proximity of the ear; watch of 12 *m.*, normal hearing distance, is merely heard on contact in the right ear, in the left not at all. Tuning-fork a^1 applied to the forehead is not perceived; applied to the teeth, it is heard in the left ear.

Otoscopic examination reveals a cicatrix in the inferior posterior quadrant of the right membrane, and several light reflexes, one situated over the short process of the hammer. Masses of epithelial debris and pus hide the membrane on the left side from view. After cleansing, a round, medium-sized perforation, situated directly under the handle of the hammer, is visible.

Clinical Diagnosis: intractable syphilis, ulceration of the skull, perforation of the palate, syphilitic cachexia, amyloid degeneration of the spleen, liver, kidneys, etc.

The autopsy made by Prof. Arnold at noon, March 31st, revealed: No rigor mortis, skin yellowish-white in color, and remarkably dry. Scalp is covered with numerous scars adherent to the skull; at places there is a loss of tissue, exposing the underlying necrotic bone. Subcutaneous cellular tissue contains no fat, and is also very dry. Bony framework large, tolerably developed. Muscles poorly developed, pale red in color.

Lungs very much collapsed. Pericardiac sac contains a small quantity of clear fluid. The sub-pericardiac fat has entirely disappeared. Heart is remarkably small in size. The endocardium of the left ventricle is discolored in places. The valves show traces of fatty degeneration. The same condition is noticeable in the tunica interna of the aorta, otherwise the inner coat is thin and transparent. The ventricle is of medium size; its muscular tissue is thin and friable, of brownish color, and contains much intermuscular fibrous tissue. A nodule of infiltration, firm in consistency, grayish-yellow in color, is situated at the apex of one of the papillary muscles.

On the right side the valves are perfectly normal. Another nodule, the size of a pea, located partly in and partly under the endocardium, is found in the ventricular wall. Muscular structures are similar in condition to those on the left side.

Left lung normal. Pleura in healthy state. The parenchyma of the upper lobe moderately vascular, that of the lower lobe somewhat more.

The right lung is at places firmly adherent to the diaphragm. The bronchi of both lungs contain mucus. The tissue of the upper lobe is, on the whole, inflated, elastic, and moist; but in its lower part is found a grayish-white infiltration surrounding a small nodule.

The state of the middle lobe is similar to that of the left upper lobe, the inferior to that of the left inferior.

The spleen is enlarged. The capsule is mottled in appearance. The tissue is very firm and moderately vascular. Bands of connective tissue are plainly visible. The Malpighian bodies are gray in color and react but faintly on application of the iodine test.

The liver is very large and heavy. The capsule is, in places, covered with pseudo-membranous exudations, and shows peculiar circumscribed opacities. The gall-bladder contains a quantity of dark-green thick bile. The parenchyma of the liver is tolerably vascular, of waxy consistency, and yields a decided reaction to the test for amyloid degeneration.

The left kidney is very small, its surface somewhat uneven. The capsule is very adherent. On section, the cortex—especially that portion above the base of the pyramids—appears quite atrophied. The tissue of the kidney is much denser than normally, and bears traces of amyloid degeneration.

The right kidney is in a similar condition.

Great destruction of the hard palate.

Only the most anterior part of the nasal septum is preserved in its integrity. The left ala is entirely sunken in; the right, partially so. The cartilaginous framework of the nose is but partly preserved.

The mucous membrane of the small intestines is considerably congested, and shows traces of amyloid degeneration. In the cæcum there are isolated pouch-like areas of ulceration, with granular bases.

The calvarium is, on the whole, very heavy, much thickened,

and highly sclerosed. Peculiar flat depressions exist on both sides of the frontal bone. The surface of the same is granular and the margins are raised. Both the coronoid and sagittal sutures are almost entirely obliterated.

On the left parietal bone, corresponding about to the protuberance, there is a depression separated from the surrounding tissue by peculiarly raised edges, the whole exceeding the size of a German two-thaler coin. The entire bone is necrotic ; its edges, in parts, superficially, in other parts, more deeply destroyed by the carious process.

On removing the top of the skull, an abscess cavity is found to exist between the parietal bone and the dura mater. The inner surface of the bone is also the seat of extensive destruction. The outer layer of the dura is correspondingly infiltrated with pus, and, in part, ulcerated. Its inner surface is hemorrhagically infiltrated and covered with exudations. The dura mater thickened and firmly adherent to the inner surface of the skull. The hemorrhagic exudation involves almost the entire middle cranial fossa, and extends also into the interior and posterior fossæ.

Anatomical diagnosis : syphilitic caries of the skull and hard palate. Chronic pneumonia and bronchio-pneumonia. Amyloid degeneration of the spleen, liver, kidneys, and intestines.

After the macroscopic examination of the middle ear, both labyrinths[1] and the cartilaginous and osseous Eustachian tube were placed for forty-eight hours in a one per cent. solution of osmic acid. They were then soaked in the decalcifying fluid, already previously described, from April 4th to June 24th. It was only at the expiration of this period that the introduction of dissecting needles indicated that the specimens were ready for cutting.

Macroscopic appearance of the right temporal bone.

The greater part of the mastoid process is sclerosed. The mucous lining of the remaining cells is slightly injected without any pigmentation. The Eustachian tube (a portion of the pharyngeal orifice is missing) is patent throughout. The tympanum contains a quantity of muco-purulent secretion

[1] Both labyrinths were small and slender.

(on microscopic examination pus cells). The mucous membrane is thickened and the part covering the promontory injected. The mucous layer of the drum membrane is somewhat opaque. The drum membrane shows the cicatrix which was visible during life, and is in an atrophic state. The bony roof of the labyrinth, especially the portion above the vestibule, is hemorrhagically infiltrated.

Macroscopic appearance of the left temporal bone.

The external canal is filled with greasy pus, and in the membrane is seen the perforation observed during life. The mastoid process is sclerosed and of ivory-like hardness. The mucous membrane of the tympanum is very much thickened and envelops all the structures contained therein. The cavity is filled with secretion which microscopically is found to be composed of pus cells and granular giant cells. The remaining mastoid cells are also lined with greatly thickened mucous membrane, which microscopically is found to be pigmented. The Eustachian tube (also here a portion of the pharyngeal orifice is missing) is pervious.

Microscopic condition of both cartilaginous tubes.

The fibro-cartilaginous portions are markedly conspicuous. The cartilage capsules are wholly or in portions so thickened, as to present cap-shaped or arched excrescences. The capsules accordingly present a great difference as regards size and shape. Some are spindle-shaped while others again are very large, enclosing more than two cells. The protoplasm of both cells and nuclei presents a remarkable change in this, that it contains numerous fat-globules. This metamorphosis has involved the nuclei to such an extent, that they appear as black bodies in the interior of the cells (the action of the osmic acid).

The glands surrounding the lumen of the tubes are preserved. The protoplasm of the epithelial cells is in a condition similar to that of the cartilage cells described above. The epithelium lining the tubal slit in some parts is in a normal state, whilst in other portions it appears in the shape of round, occasionally bullet-shaped, low cells with their apex

pointing toward the lumen of the tube. Portions of the submucous layer are infiltrated with small cells, and the pharyngeal mucous membrane, of which only a small piece is preserved in the specimens, is densely infiltrated with lymphoid cells. The preserved fibres of the tensor tympani muscle are to all appearance normal.

Microscopic condition of the carotid contained within the temporal bone; also of the osseous portion of the Eustachian tube.

There is no noticeable change in the inner coat of the vessel. The venous channels (Rektorczik) surrounding the entire circumference of the outer tunic, varying in size from 0.21 to 0.39 resp. 0.98 *mm.*, are on the left side filled with coagulated blood. Those on the right side are empty, but they are here so numerous, and the partitions separating them are so narrow, that they present a completely fenestrated appearance. No change was noticeable in any portion of the outer coat[1] of the vessel on either side, not even in that part where the carotid canal was separated from the free space of the osseous portion of the tube by a layer of bone but 0.087 *mm.* in thickness. The villi of the mucous membrane lining the medial wall and floor of the osseous portion of the tube with its epithelium, seem perfectly normal, while the periosteum of the osseous portion in a medial direction is changed and thickened in a manner to be described later on of other bones.

Microscopical examination of the periosteum and the bone of the middle and internal ear.

As the results of the examination of both sides are almost identical, the following description applies to both. Large medullary spaces filled with small, round cells, vessels with delicate walls, and blood-corpuscles were found in the floor of the tympanum and below the cochlea. Some brown granular pigment and remarkably few fat-globules[2] are interspersed between the cells. Examination of the roof of

[1] Excepting a possible thickening of the walls of the vasa vasorum.

[2] Each microscopic field of vision contained but five to eleven. The osmic-acid staining greatly facilitated the counting.

the tympanum, of the bone over the semicircular canals and of the lateral wall of the osseous portion of the tube showed a similar condition. *In the last-mentioned locality the medullary spaces present the most marked pathological changes. Fully one half, and even more, of the whole medullary space is filled with numerous thin-walled vessels and enormously large heaps of cells containing blood-corpuscles and yellow pigment of various shapes.*[1]

The great development and irregular formation of these medullary spaces, between which there are remaining only very narrow bridges of bone, is striking. In certain portions the solid bone-substance had probably been absorbed, and thus brought about the confluence of the medullary spaces, a condition similar to that described by Neumann as "lacunary dilatation of the medullary spaces occurring in leucæmia" (E. Neumann, "The Importance of the Bone-Marrow in the Formation of the Blood," *Arch. f. Heilkunde*, 1869). Several spaces in the bone, ranging in size up to 3 *mm.* in length and 2 *mm.* in width on the left side, and 2 *mm.* in length and $1\frac{1}{3}$ *mm.* in width on the right side, with varying contents, were noticeable in the anterior wall of the bony vestibule and in the osseous tissue anterior and posterior to the second curve of the Fallopian canal.[2] The contents of these spaces clearly demonstrate two separate stages in the pathological process. In the early stage these spaces were filled with a fibrous net-work, which in several sections showed an unmistakable connection with the periosteum of the labyrinthian wall (*vide* Fig. 3, *hr'*). The meshes of this network were filled with vessels more or less numerous and a small-celled infiltration. The condition demonstrating the second or later stage, however, mostly predominated. Here the meshes were filled with yellowish, coagulated masses, composed to a limited extent of blood-corpuscles and larger round cells, and mainly of fat-globules and fatty, degenerated cells stained black by the osmic acid. In addition

[1] The significance of this observation relative to syphilitic cachexia will be published in the *Berlin. klin. Wochenschrift.*

[2] A similar condition was observed in the bone tissue below the first turn of the cochlea on the right side. The cavity here was circular, its diameter measuring 2 *mm.*

there were seen in many places, as indications of the earlier stage, the remains of the fibres of the network in connection with the periosteum of the labyrinth mentioned above.

The promontory.

The condition of the periosteal covering of *the promontory* on both sides is worthy of special notice. Very much thickened, at places to 0.7 *mm.*, the presence of numerous cavities, imparted to it a cavernous appearance (see Fig. 1). The spaces were here and there lined with a low cylindrical epithelium, and in some places were filled with a tissue composed of fine fibres, enclosing coagulated fibrin and fatty degenerated cells. At first glance these spaces gave the impression of gland tissue; closer examination, however, proved them to be numerous circumscribed foci of inflammatory products undergoing retrogressive changes. We are undecided whether or not to regard the cells lining the spaces as epithelial structures or as products of the early stage of the inflammation which had not joined in the general retrogressive metamorphosis.

The presence of smaller and larger portions of bone, normal in structure, cut off from the main bony mass of the promontory by the strangulation of the proliferating periosteum, deserves additional notice. In some portions of the section these spiculæ of bone are arranged in rows, separated from each other by narrow bands of periosteal tissue (*vide* Fig. 3, *ak*). In other parts the proliferating periosteum produced deep indentations in the bone.

The periosteum of the canalis pro tensore tympani and that lining the delicate canaliculi of the plexus tympanicus presented a similar pathological appearance.

The membrane of the round window and its niche.

The membrane of the fenestra rotunda on both sides was thickened and bulging outward. It was adherent in many parts to the neighboring structures. Between it and the bone are the masses of cheesy debris described above.

Region of the stapes.

As regards the formation of strands and the presence of cheesy masses, the same as above.

Nerves.

Several sections of the right facial nerve, made from a portion peripheral to the ganglion geniculi, show a semi-lunar-shaped space, which looks as if it were made by a gouge between the posterior wall of the canal and the nerve, measuring about 0.32 *mm.* in breadth and 0.76 *mm.* in length (*vide* Fig. 2 *nf*). Rust-brown, homogeneous deposits of pigment are here and there noticeable between the fibres of the acoustic nerve. The perineurium of the tympanic plexus is the seat of several hemorrhagic extravasations.

Membranous labyrinth.

Both the perilymph and endolymph are everywhere coagulated, and contain in places red blood-corpuscles, pigment, small cells, and fat-granules. This condition is most marked it the right scala tympani.

Right cochlea.

A round empty space, measuring about 0.24 *mm.* in diameter, is noticeable in the group of ganglion cells in Rosenthal's canal in the first turn of the cochlea. This cavity or space is produced by a destruction of the ganglion cells and the nerve fibres. A small nerve strand, however, passes alongside of this defect, and sends branches to the intermediate space of the lamina spiralis ossea. This empty space is demonstrable throughout the entire first turn of the cochlea.

The vessels of the modiolus are filled with blood and many are surrounded by masses of brownish-red pigment. Larger, more recent hemorrhagic extravasations are found between the nerves in the modiolus, at about the level of the first turn of the cochlea.

Left cochlea.

Corti's membrane, in one preparation, was separated from its point of insertion at the crista by an irregularly shaped, colloid-looking mass; a globule of colloid matter adhered to its outer edge.

With the exception of the outer cells of Corti, the struc-

tures of the ductus cochlearis were preserved on both sides. In the place of these cells small aggregations of granular matter stained black by osmium were visible in the lamina reticularis. It was difficult to decide whether or not this granular debris was the remains of the outer cells. The fact that the fine nerves passing through the tunnel of the arches of Corti were in many sections still visible would not favor the assumption of any pathological change. We have already on former occasions called attention to the fact that the absence of the outer cells of Corti may as well be due to the action of the reagents as to a pathological process. The condition of the inner cells of Corti, which, although very plainly visible, had a shrunken and remarkably granular appearance, would in this instance favor the latter view.

Membranous structures of the vestibule and the ampullæ.

On the right side, the region of the nerves supplying both the upper ampullæ, was marked by the presence of very large, tortuous, and turgescent vessels.

There were numerous vacant spaces in the nerve-epithelium of the upper ampullæ of the left side.

The cupulæ terminales on both sides were entirely preserved, but only very few papillæ of the membranous semicircular canals were to be seen.

Remarks.

Taking into account that in our case we had to deal not with a fresh gummous neoplasm, but with the later consequences of periosteal proliferation, the above-described changes in the periosteum, with their consequences, show a close correspondence with the description given by Rindfleisch[1] of syphiloma ossium. According to Rindfleisch, *l. c.*: "The blood-vessels passing everywhere through the neoplasm are surrounded by concentric layers of a delicate, jelly-like, in places fibrous, basis-substance, containing numerous round and spindle-shaped cells. I recognize these as the periosteal vessels—that is, vessels that pass be-

[1] "Pathologische Gewebelehre," fifth edition, p. 572, sec. 649.

tween the periosteum and the bone, and supply the outer layers of the latter. The adventitia of these vessels is the original matrix of the syphiloma. A continuous proliferation of cells and deposit of basis-substance, concentric in arrangement, start from here, and thus the neoplasm assumes a laminated appearance. The continually increasing deposition and swelling up of the basis-substance acts mechanically upon the periosteum and bone. The former is lifted off from the bone, the osseous structure itself becomes softened, and eventually a loss of substance takes place (caries syphilitica). The syphilitic infiltration creeps along the Haversian canals, invading the compact structure of the bone, and produces localized absorption of the tissue, a process similar to that produced by the exuberance of medullary granulations in rarefying ostitis. Finally, after the bone tissue interposed between the two vessels has become entirely destroyed, the two syphilomatous masses unite and become one," etc., etc.

As we have already mentioned, we had to deal with a later stage of the pathological changes of the periosteum and bone, and are, therefore, unfortunately, not in a position to pass judgment as to the first beginnings of syphilitic changes in the periosteum and bone, and especially as regards "the concentric deposits surrounding the blood-vessels that pass through the neoplasm," etc. Our observations, however, fully coincide with the consequences of the process as described by Rindfleisch, and supplement his description by demonstrating that portions of the surface of the bone may be entirely cut off by the proliferating periosteum (*vide* Fig. 3, *ak*). That the alterations in the periosteum played the first and most important part in the morbid process was demonstrated mainly by the presence of the two stages which we have described in connection with the hollow spaces found in the bony capsule of the labyrinth. As the earlier stage of the process, we regard the spaces still filled with a fibrous tissue similar to periosteum, and in part infiltrated with small cells. The continuity of the tissue with the periosteum of the labyrinthian wall was plainly visible in several preparations (see Fig. 3, *hr'*). As the later stage we

regard the spaces filled with cheesy masses, occurring in various portions of the petrous part of the temporal bone, as, for instance, in the bony capsule of the first turn of the cochlea,[1] on the right side, in the anterior wall of the vestibule,[2] and in the vicinity of the Fallopian canal.[3]

The condition of

the spongy bone tissue

is deserving of special notice.

As already described, we found the markedly dilated medullary spaces,[4] not only enclosing the usual normal contents, but also invariably filled, sometimes more, sometimes less, with large or smaller groups of cells, enclosing blood corpuscles, and also with conglomerations of yellow or yellowish-brown pigment.

Evidently we had to deal here with the products of a metamorphosis of blood-extravasations, the result of rupture, of the thin-walled vessels contained in the medullary spaces. It is obvious, that these hemorrhages are not limited alone to the temporal bone, but that, in all probability, this morbid process simultaneously affects the medullary spaces of the osseous system in general. *As frequent examinations and pathological observations render it probable, that not only the liver and the spleen, but also the medulla of bone, take an active part in the formation of blood-corpuscles the pathological changes found in the bone marrow, as described above, give us an additional hint as to the genesis of the syphilitic cachexia.*

Clinical importance of the other observations.

The hemorrhages found in the neurilema of the plexus tympanicus, as well as the exuberance of the periosteum, explain to us the genesis of many of the so-called pure, "nervous otalgiæ," occurring without objective signs of ear disease in the course of constitutional syphilis.

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[1] *Vide* Fig. 3, *hr''* and *hr'''*. [2] *Vide* Fig. 2, *hr* and *hr'*. [3] *Vide* Fig. 2, *p.d.*

[4] Bäumler, in treating of the changes of medullary bone tissue occurring in constitutional syphilis, expresses himself, as follows (*vide* Ziemssen, Infectionskrankheiten, 2, Auflage, 1876): "While osteomyelitis gummosa appears in the medulla of long bones in the form of insignificant tumors, it forms in the spongy tissue of the flat bones, notably those of the skull, a kind of infiltration. The proliferation of cells, originating from the blood-vessels, produces a dilatation of the bone canaliculi and of the medullary spaces." It is evident that only the last-mentioned consequences of the pathological condition were still present in our case

Considering the absence of a not inconsiderable number of fibres of the right facial nerve (*vide* Fig. 3, *nf*), it is remarkable that no paretic disturbances were ever present. It is, however, possible, that this condition may be a hitherto unrecognized anomaly of development.

The clinical bearing of the periostitis at the promontory demands a more extended notice. In cases of aural troubles, without objective symptoms, occurring in syphilitic subjects, in which the functional examinations point toward a peripheral disease of the auditory organ, the diagnosis of periostitis of the labyrinthian wall may be hereafter be made with a great degree of probability.[1] The dissimilar course of the pathological processes in the muco-periosteal lining of both tympanic cavities is worthy of notice. The appearances in the right cavity, in the main, were those of a chronic muco-purulent catarrhal condition, without any perforation of the membrana tympani. The presence of what we briefly called a scar, may also have been caused by an atrophic condition of the membrane, or have been the result of the repeated paracenteses. The perforative middle-ear inflammation developed comparatively late on the left side.

The penetration of the proliferating periosteum into the thin bony septum dividing the *osseous portion of the tube from the carotid canal* will afford an explanation for those fatal hemorrhages which occasionally occur in syphilitic subjects, and which are attributable to caries. It will also explain why ligation of both common carotids, as performed by Billroth, in a case described by Pilz, can have no permanent effect in these cases. The observed changes in the periosteum and bone of the right tympanic floor invite attention to a possible involvement of the bulbus ven. jugularis, similar to that of the carotid, in the dangerous hemorrhages occurring in tertiary syphilis.[2]

[1] The attacks of otalgia, as above mentioned, will serve as an adjunct in making this diagnosis.

[2] It is to be taken in consideration, that frequent observations have demonstrated that the bony confines or the carotid and of the bulb of the jugular vein are comparatively often exceedingly thin and contain dehiscences of varying size (Friedlowsky, Zuckerkandl, Hessler). In case this morbid process should affect a person whose ear is unfortunately the seat of this anomalous condition,

The syphilitic process, however, did not produce similar changes in all portions of the temporal bone. The bony roof of the labyrinth, notably that portion above the vestibule, showed traces of a hemorrhagic infiltration, while the mastoid cells on both sides were sclerosed. This dissimilar condition may possibly be attributed to a relatively smaller blood supply to the mucous membrane lining the mastoid cells. No anatomical data have as yet been gathered as regards this point.

The numerous hemorrhages are easily explained by the peculiar changes in the vessels called forth by the constitutional disease.

Tuning-fork test and appearance of the cochlea.

Although the post-mortem examination showed destruction of the nerve-fibres and ganglion cells in a portion of Rosenthal's canal, in the first turn of the right cochlea, the patient was still able to hear, as the clinical notes demonstrate, the tuning-fork *a'* through bone-conduction on the same side. Unfortunately, the patient died ere we were able to examine him with higher-pitched tuning-forks. As part of the fibres (*vide* description in detail) were, however, preserved, he may have perceived the vibrations of the tuning-fork *a'* by means of the same. Finally, we wish to call attention to the normal condition of the epithelium lining the osseous portion of the tube. This is probably allied with the fact, that the morbid process affecting the bony framework of the middle ear had its primary seat in

fatal hemorrhage would set in comparatively soon. Hessler, in treating of this subject (*Arch. f. Ohrenheilk.*, Bd. xviii., p. 1, ff.), mentions two cases of fatal hemorrhage due to syphilis (a case described by Pilz, p. 11; and another reported by Tüngel, p. 28). Tüngle's case (reported in full in the *Deutsche Klinik*, No. 23, 1863, p. 225) occurred in a patient suffering from tertiary syphilis. After being under observation for two years, a sudden profuse hemorrhage set in from the left ear, and four months later, after repeated hemorrhages, the patient died. An autopsy revealed a complete destruction of the interior of the petrous portion of the left temporal bone; other notes were missing. Pilz's publication ("De Arteriæ Carotidis utriusque Ligatura," Dissert. Berlin, 1865) relates to a case of erosion of the carotid artery and destruction of the pharynx, due to syphilis. After repeated copious hemorrhages, Billroth first ligated the right, then the left carotid, but symptoms of most marked anæmia set in and death ensued. A post-mortem examination showed that an extensive carious process had involved the lower wall of the canal of the carotid, exposing the vessel in this part. The eroded portion of the vessel measured 8 *mm.* in length and 6 *mm.* in breadth.

the submucous tissue—this, as is well known, plays the part of the periosteum.

Explanation of the Illustrations.

FIG. 1. A vertical section through the promontory of the left pyramid. (Hartn. $\frac{8}{2}$). *p* = sprouting periosteum. *k* = bone. *ls* = ligamentum spirale of the first turn of the cochlea with a portion of the crista spiralis. *hr* = new-formed cavity, containing mainly fat stained black by osmic acid and cheesy debris. The proliferating periosteum shows many of the empty spaces described in the text (*vide* p. 206), which lend to the structure its cavernous appearance.

FIG. 2. A vertical section through the petrous portion of the right temporal bone just posterior to the oval window. (Hartn. $\frac{8}{2}$.) *lt* = labyrinthian wall of the tympanic cavity. *mv* = medial wall of the vestibule. *nf* = facial nerve showing the semilunar defect as described. *pd* = pathological loss of bone adjoining the Fallopian canal. *pv* = pathologically changed periosteum lining the tympanic cavity. *n* = section of a small nerve, probably a branch of the tympanic plexus. *hr* = a larger nerve. *hr'* = two smaller new-formed cavities separated from each other by a layer of periosteal-fibres, and containing the hemorrhagic cheesy masses as described. Between the small nerve and the facial nerve two smaller blood-vessels coursing in the direction from the periosteum towards the larger pathological cavities. A few colloid globules adhere to the edge of the latter at the point where the vessels end. *vpg* = thickened periosteum with blood-vessels.

FIG. 3. A vertical section through the promontory of the right pyramid. (Hartn. $\frac{8}{3}$.) *Tr* = region of the drum cavity. *Lw* = region of the cochlea. *ak* = four islets of bone cut off by the proliferating periosteum. *hr*, *hr'*, *hr''*, and *hr'''*—pathological cavities in the interior of the bone, in part filled with sprouting periosteum (*hr*), in part with periosteum and fat-globules (*hr'*), and partly with coagulated cheesy debris (*hr''* and *hr'''*).

The cavity *hr'* is still in connection with the periosteum of the labyrinthian wall, the starting-point of the new growth, by means of a small bridge of periosteal tissue. The pronounced shading at the periphery of the two cavities (*hr''* and *hr'''*) filled with cheesy debris represents the remnants of the sprouting periosteum. All the remaining tissue is bone structure, poor in bone corpuscles, and measuring but 2 *mm.* in the direction ☞ *s* to the first turn of the cochlea.

GENERAL ATROPHY OF THE CONDUCTING APPARATUS OF THE EAR.

(*Proliferous Inflammation.*)

By S. O. RICHEY, M.D., Washington, D. C.

IN *The American Journal of Otology* (vol. iv., p. 266) may be found a paper, by Blake, of Boston, on *The Progressive Growth of the Dermoid Coat of the Membrana Tympani*, in which the progress of paper discs from the membrane of the drum outward is described.

I have not repeated the experiment, but many of us have watched a blackened eschar from nitrate of silver follow the same course. The chief importance attachable to this action of the epidermis is that it offers us a rational explanation of the impaction of cerumen in the external meatus.

It seems like going far afield to attribute the collection of wax to hypersecretion or mechanical impaction, when it so often occurs without these causes being ostensible, and, on the other hand, when these so often exist without being followed by this condition. Children are most exposed to mechanical impaction in the anxiety of mothers, or the mistaken diligence of nurses in their efforts to "keep the ears clean," yet it more rarely occurs at this age than at any other, thus proving that these act only as occasional and remote causes. Why should wax collect a second time in the case of an adult, who has been advised that he was probably instrumental in its production by his attempts to wipe out his ears with a towel during his bath?

Do we often find other evidence of hypersecretion than the *amount* to be removed?

In children there is greater functional activity than in adults, and yet impaction of wax occurs most frequently after twenty-five years of age, and I am disposed to look for its cause in *impaired nutrition of the tissues of the external meatus, which, by retarding the progress outward of the epidermis, only delays the removal of the cerumen in a natural way.*

Of course, if this explanation be accepted, it will lead us into a consideration of the disease of the ear with which the collection of wax is associated, and upon which it, in a great measure, depends. In time this view may be taken and collection of cerumen looked upon as merely an early symptom of a process which produces great deprivation and distress; a symptom which may put us on our guard and enable us to protect our patients, and remove a reproach to the workers in our special field by inducing us to undertake their treatment in the early stages of a disease, for which we wait now, until it has so much altered the tissues making up this organ that the ear cannot perform its function.

The affection is variously called "The atrophic class of chronic aural catarrh"[1]; "The so-called sclerotizing form of inflammation"[2]; "Proliferous inflammation of the middle ear,"[3] etc.

Writers on this subject do not seem content with the term *inflammation*, and evidently call it such for want of a better name, or a clearer understanding of the process. In many instances the ordinary symptoms of inflammation are entirely absent, and we are able to get no history of their ever having existed, though sometimes we learn that the individual noticed such symptoms a long time before, perhaps in childhood, but in recent years nothing had occurred to fix his attention upon this organ or its appendages.

In case of such antecedent history, there is characteristic evidence of the inflammatory process, involving the nares, post-nasal pharynx, Eustachian tube, and middle-ear cavity, in hypertrophy of the lining membrane, increased secretion,

[1] Burnett: "Trans. of the Am. Otological Society," 1885, p. 414.
[2] Politzer: "Diseases of the Ear," Am. ed., p. 79.
[3] Rossa: "Treatise on Diseases of the Ear," 4th ed., p. 282.

and temporarily impaired hearing, associated frequently with tinnitus: and, at a later period, with adhesions of the ossicula auditus and the tensor muscle, with retraction of the membrana tympani. These individuals can tell of frequent variations in all the subjective evidences of the affection, depending greatly upon the barometric condition of the atmosphere. When we can distinguish these cases as a class, we have *at once* an indication as to the probability of improvement by treatment, for these can be classed clearly as *catarrhal,* and are as amenable to treatment, though not so prompt in reponse, as catarrhal conjunctivitis. In this they differ from the other class which we are attempting to discuss, which have no antecedent history of inflammatory action so far as we can learn, but are characterized clinically by the familiar combination of symptoms of impaired hearing, constantly, but slowly, gradually and insidiously progressive, without inflammatory pain, ostensible swelling, or increased secretion at any time.

My observation teaches me that one of the very earliest evidences of this disease, and one so little liable to attract notice that the patient's attention must often be directed to it, is a *seething* tinnitus. This will increase and become more decided as the disease progresses, until it forces recognition, and then only will there be complaint. This is as insidious as the deafness. The Eustachian tube is not only pervious, but often unusually large and dry, with nothing to indicate that it has ever been seriously obstructed. The middle-ear cavity is abnormally dry and free from secretion. The membrane of the drum is blanched, opaque, apparently smaller in size, retracted, motionless during inflation, and often striated. The external meatus is dry and often irritable, with a history of one or more removals of wax.

There may be exfoliation of epidermis, and sensitiveness of exposed nerve filaments in the early stages. Later, the meatus becomes enlarged from the close adhesion of the skin in the osseous portion, and the probable decrease of connective tissue and atrophy of the ceruminous glands. Some or all of these changes are present.

To me this presents more the phase of a local atrophy

than of an inflammation, and I think its subsequent history and the measures which contribute most to its relief will bear out this view. The more serious affection may be masked by a catarrhal trouble present, and may not be apparent until this is relieved. Here often exists the cause of the seeming confusion in diagnosis and the difficulty of prognosis.

Burnett[1] of Philadelphia describes an "atrophic class of chronic aural catarrh," in which "the nares are atrophic, their capacity is increased, the mucous membrane over the turbinated bones and septum is pale, dry, and shining, or varnished in appearance."

Atrophy of the ear may exist without, though usually with, this condition of the nares: the undue and excessive patulence of the Eustachian tube is always present, according to my observation.

It may be a secondary degenerative process after, and the consequence of, an hypertrophy of the same tissues, in which they assume a lower form than is absolutely requisite to the functions of the organ, associated with other and accidental conditions—*accidental* in the sense of not occurring in every case.

Many writers look upon the impaction of wax with suspicion as an evidence of deeper-seated trouble, chiefly because often after its removal, impairment of hearing persists; though by others this is considered merely a complication or a co-existence of two diseases, instead of an extension of the same morbid change, expressing itself by its interference with the function of the parts attacked.

As the affection progresses, there is a change from the collection of cerumen to a complete cessation of its secretion. "In certain cases of well-marked deafness it is a common experience to hear patients say they never find wax in the ears, and have not for months or years past."[2]

Buck and Pomeroy[3] seem to think this due rather to reflex action of the pharyngeal upon the ceruminous glands, than to a direct extension of the affection through the

[1] "Trans. of the American Otological Society," 1885, p. 414.
[2] Buck: "Diagnosis and Treatment of Diseases of the Ear," p. 59.
[3] "Trans. of the American Otological Society," 1872.

middle-ear cavity to the meatus, which to my mind seems the natural and actual course. "The mucous membranes, in accordance with their course, have a great tendency to communicate their affections."[1] "Atrophy of the drum membrane, partial or total, is very common. * * * There are cavities lying above the meatus which are part of the middle ear and lined with mucous membrane."[2]

Nearly all observers believe that the tissues of the middle-ear cavity share in the changes found in the pharyngeal cavity, and the conditions of the drum membrane certainly favor this view. What is to prevent an extension by continuity? The blood-vessels of the cavity of the middle ear, the membrane of the drum, and the meatus are continuous to a great extent, as are those of the Eustachian tube and the middle-ear cavity, transmitted from the ascending pharyngeal and inferior palatine arteries. The efferent fibres of the trigeminus supply vaso-motor influence to some of the blood-vessels of the face, the external meatus, and the upper and anterior part of the middle-ear cavity. Beside the continuity and similarity of tissue, what better common vascular and nerve supply can be conceived? Sharing the *same* nutrition, should not the nutritive changes be the *same* in each?

Schwartze says that purulent inflammation of the meatus "without perforation of the drumhead, which is met with in adults, is usually only an accompanying symptom, or *a precursor of acute inflammation of the drum cavity.*" If I understand this, it means that the cause exists originally in the meatus, or that some influence acts upon both the meatus and the cavity, the meatus first responding, as most easily affected. Have we not here, in an acute inflammation, an analogue to the probable course of events in a severely chronic process? To quote Woakes: "Most chronic diseases of this (post-nasal) region tend to impair the functional activity of the nerves distributed to it, * * * which may induce its own set of changes in the auditory apparatus after the causes exciting it have disappeared."

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[1] Johannes Müller: "Handbuch der Physiologie," vol. i., p. 651.
[2] Schwartze: "Pathological Anatomy of the Ear," Am. ed.

This affection does not often occur in persons under thirty, and each decade after this age appears to have a progressively greater number of sufferers. This is probably due to diminished physical vigor of the general system which has a decided predisposing influence in its production. There is reason to believe that general mal-assimilation and the condition of exhaustion incident to parturition are active factors. We know that perforations of the membrana tympani rarely heal in persons afflicted with phthisis.

Wilde has seen speckled opacity of the drumhead in women deaf after parturition. Calcareous deposits are observed in the drum membrane which do not more need an inflammation for their production, than does ossification of the arteries. Ossification, according to Schwartze, may occur within calcified membranes. It is a gradual retrogression in tissue character.

Local atrophy of the skin is sometimes seen in old people in the regions limited by the distribution of a nerve, especially some branch of the trigeminus. This kind of change takes place with advancing age in most people, though some show the senile changes earlier than others.

It is somewhat curious that this disease is comparatively rare among young people; as rare as the arcus senilis. I have never seen it in a child whose circulation has power to overcome the difficulties to which that of older people succumbs.

Treatment.—Politzer[1] thinks "a classification on a clinical basis seems best at present."

In this consideration the methods and results of treatment claim space.

As to its incurability and hopelessness the opinion is almost consentaneous. We know, however, how it must end unless some effort is made, and yet, it is not an attractive field in which to work.

Any surgeon will feel it his duty to do what he can, even with a very slim chance, to retard an optic atrophy, which means only blindness; whereas, in a disease which must ultimately, if left to pursue its course, result in profound

[1] "Diseases of the Ear," Am. ed., p. 241.

deafness; and worse, in distracting tinnitus, a wretched feeling of compression in the head, and a depression of spirits suicidal in the impulses it engenders, he feels that he has done his duty, if, without any effort, he dismisses his patient with the prognosis, *incurable;* thereby, in proportion to his eminence in his work, condemning the sufferer to despair more or less complete.

My experience has taught me that these cases are not, as a class, so hopeless as those of optic atrophy. In those more advanced in age they are comparatively so, but in younger people of good nutrition in other respects, there is a chance by careful, persistent, and judicious management, to make many of them better, or, at least, to delay the evil.

Time and patient effort cannot be dwelt upon too much, for without these nothing will avail. We are dealing with a process which has generally been existent for years, and three, six, or twelve months will often give no indication of the ultimate result. We must persist, encourage the patient though it require much labor on our part and expense on that of the patient, and the end will frequently repay him. Our great difficulty will be found in the willingness of the patient to persist. If, however, the facts are made clear to him in the beginning, and he is assured that a spasmodic effort will bring nothing but expense and lost time; that, if he commences, he must first resolve to continue for at least three years, the way is made easier.

My first experiment was made with a patient in the hospital, a protégé of Sweet Charity.

The conditions were as heretofore described. For two and a half years no change was perceptible in the function of hearing, although the middle ear became less dry, the membrane gradually resumed a better position and improved in vitality, and the dermis of the meatus became more pliable, and the ceruminous glands again secreted wax. During the next six months there was a change from profound deafness to a condition in which the hearing seemed only slightly impaired for practical purposes, and I lost sight of him.

A delicate test he did not hear at first. We were satisfied,

if by any effort of voice, we made him understand what was said. At the last, he could hear readily conversation addressed to him at a distance of some feet (six or eight).

Another, whom I saw first in 1879, had been a general of volunteers during the civil war, and attributed the deafness in the left ear to the concussion caused by cannon in 1863, though it had continued to grow steadily worse. Hearing with the right ear became impaired, he thought, through sympathy. He never had pain, but there was a constant singing in both ears, which very occasionally varied to the sound of ringing bells. His health had always been good, except that he "once had inflammation of the brain." Such was the history given. He could not hear my watch in contact with either ear until after inflation, when it was heard in contact with the left ear, and with the right ear as close as I could hold it, without contact. *Ett* were free: *Mtt* opaque, without lustre, and diminished in diameter; the meati were desquamating, with no account of accumulation of cerumen: air forced into the middle ears sounded as if passing through a quill.

According to his statement, he had been advised by one of my confrères, that it was better to let them alone, as the condition was not curable. I could not give him a very favorable prognosis, but told him if he began it he might be compelled to continue under treatment for three or four years or be disappointed. As he was unfitted for his occupation, he decided that he would take the chances. For eighteen months there was no change in the tinnitus or the hearing, although the *Mtt* regained their lustre, and the ceruminous glands resumed their function; the pharynx lost its pallor, and the lining membrane of the middle ear became moist, as the sounds during inflation proved. In my examination I could not attract his attention by shouting across a room sixteen feet wide; at the end of two years he could carry on a confidential conversation, and hear the debates in Congress from the reporters' gallery, which is very difficult. When his hearing was sufficient for practical purposes, he discontinued, and I have had no opportunity to test his hearing since, but having met him a

few weeks ago (Dec., 1885) on the street, he told me that he continued to improve, and more during the past than any previous year; that he was conscious of hearing new sounds from time to time. He has no tinnitus.

These are two of a number of experiences, and seem to me enough to encourage further trial in these cases. I know that the weight of opinion is against this view, and, for that reason, was not hopeful at first, but my impression of the affection is based upon my personal experience, and the kind of treatment that has given the best results in my hands, and, because of this, I do not feel justified in condemning these people to separation from their fellows without a fair and intelligent attempt to save them.

It seems to me a misfortune that we do not undertake these cases in the earlier stages, when is first noticed a derangement of the secretion of cerumen, long before the tissues of the conducting apparatus of the ear are so much altered as to impair the proper performance of its function. Deafness and tinnitus are only, as we know, the symptoms that something is awry and the more speedily this is corrected the more easily it is done.

Generally, however, the ears have been syringed, and impacted cerumen removed one or more times, before a special surgeon is consulted. The view ordinarily taken, that impaired hearing due to plugging of the meatus depends upon that alone, and that the removal of this plug is *all* that is necessary, has its evil influence. When that is done, *the disease which causes it is left to pursue its course unmolested.* Often, after the wax has ceased to collect, the individual, or his family physician for him, syringes the ear, under the impression that impaired hearing is again due to the same cause as at first, and forcing a stream of water upon the exposed drumhead cannot be beneficial.

Would it not be better *not* to wait for impairment of hearing, but to try to relieve the disease which must ultimately produce it? We would not, I think, find so many cases of doubtful prognosis if we pursued this course. It is poor observation which does not find this affection often where the hearing is normal; the organ is only not so much

changed as to prevent hearing. Is it wise to dismiss a case as cured in which impaction of wax has existed only with its removal?

I ask only that these cases shall be watched carefully with these suggestions in view.

Tinnitus can often be relieved by a restoration of the nares, particularly the posterior nares, to a condition approaching the normal; but I do not think this exercises any except a remote influence upon the hearing. The impaired circulation, which is at the foundation of this affection, should be quickened, and the result, depending upon the power of recuperation in the individual, will vary greatly. Improving nutrition in this way is all we can do.

As to the methods of improving nutrition:

While we all, or nearly all, agree that the galvanic current has no demonstrable influence upon the nerves of special sense beyond that of excitation, is it so clear that it does not improve the nutrition of the tissues of the middle and external ear through the sympathetic system?

My chief reliance in these cases has been vapor of iodine, and I judge of its effect by the appearance of hyperæmia of the drum-membrane, and particularly of the vessels along the manubrium of the malleus. In cases of long standing it is not possible to get this effect at once, but by an interview every day for several weeks it is accomplished, and then it is needful to see the patient only often enough to foster a moderate amount of action. This will vary with the individual and the length of time the disease has already existed. In some old cases it can not be done at all, and these are hopeless.

After a time the sensations of the patient will aid us, but at first these are unreliable as a guide to the effect produced: the feeling is one of glow or moderate warmth, and, in most instances, the drumhead will then show the effect. In hardened cases, months may pass before there is any feeling or other evidence of hyperæmia, and experience and close observation must be our guides.

It is well to take the same precautions against an acci-

dental increase of the effect that would be taken in subacute catarrhal inflammation, as it is desirable to maintain control of it. I have had one accident in seven years. The patient left my office after being treated one spring day, when it was too warm in the house with the windows down and too cold with them open. He went to the court-house, sat in a crowded room with his back to an open window for an hour, and that night had an acute inflammation of both ears, following a chill, which might have happened under such circumstances if he had not been treated. The ears suppurated, but he recovered entirely with good hearing; as much improvement as I *might* have made in a month, or six months, in the way described. This was five years ago, and his hearing is as good to-day.

Every operation is attended with *some* risk.

This method requires, of course, the Eustachian catheter, in order to make the application as directly as possible to the affected regions, and even with this condition progress is slow, but there is generally *progress*.

In affections of the ear, acute or subacute in character, in which tinnitus and deafness depend upon closure of the Eustachian tube by congestion of the lining membrane, and in which both ears are affected in a like degree, the Politzer method of inflation is often serviceable. To apply simply the air-douche to the ears indirectly in this state of progressive atrophy does not promise much. It requires medication of very direct character, and not that air shall be compressed in the pharyngeal space, to find its way by mechanical force in the direction of least resistance, which means into the *better* ear, if there is a difference. This does not seem to be in accord with the careful and rational course usually pursued by us.

With the catheter the application is made directly towards the diseased region, and my observation leads me to the conclusion that the objections made to the use of the instrument are captious, except in occasional acute or subacute inflammation. The chief advantage of the Politzer method is that it requires no special skill, but may be ap-

plied with facility, especially in the case of children, and even them it alarms.

Its disadvantage is that it is remote in its effect, which is increased by the facts that the ear least affected is usually most treated, and that it is given into the hands of laymen, who treat their symptoms and not the disease underlying them.

The objections ordinarily made to the use of the catheter are that, by contact, in increases local congestion, is painful, and has no advantage over other methods.

The use through the catheter to the Eustachian orifice and the vault of the pharynx of such an astringent (sol. argent. nit., 1–500 parts) as might be applied to an eye affected with a slight catarrhal conjunctivitis, will not only abort the deleterious effect of the instrumentation, but will greatly benefit the hyperæmia which makes advisable the introduction of the instrument. In fact, I know no means so cleanly, so agreeable, and so effective of treating the posterior nares and the vault of the pharynx, and I think I have tried them all, except the use of ointments as suggested by Seely,[1] of Cincinnati. That its introduction is disagreeable no one can deny; all agree that it can, by unskilful management, be made very painful, but even with greatly distorted nares, if handled with some knowledge of the anatomy of the region, and some degree of *tactus eruditus*, it need be only disagreeable, as children after their first alarm usually submit gracefully, which they never do to pain. They manifest more rebellion against the Politzer method than against the use of the catheter after it has once been skilfully used. The danger of mechanical injury from instruments introduced behind the velum (the probang, or ordinary spray apparatus) is greater than from the catheter properly used.

Conclusions.—That, proliferous non-suppurative inflammation of the middle ear is, in the nature of the structural changes, a general atrophy of the tissues making up the ear.

That, impaction of cerumen, and an almost inaudible *seething* tinnitus are separately, or together, among the earliest symptoms of the disease.

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[1] "Trans. of the American Otological Society," 1885.

That, a collection of cerumen is not due to increased action of the glands, necessarily, but to *retarded motion outward of the epidermis of the external meatus* resulting from progressive atrophy, which, in time, affecting the glands diminishes their secretion.

That, it is advsiable *not* to wait for deafness before beginning treatment of the structural impairment upon which it depends.

That, with care at a proper period, these cases are curable as a class.

DESCRIPTION OF A NEW KNIFE FOR REMOVING ADENOID TUMORS FROM THE NASO-PHARYNGEAL SPACE.

By A. GUYE, of Amsterdam.

Translated by Dr. Morris L. King, New York City.

(*With a wood-cut.*)

I WISH to publish the description of a new circular knife, made by Mathieu, of Paris, from specifications given by me, and which has been in successful use for some time. The instruments which have heretofore been used in operating on adenoid growths, have not seemed to me very satisfactory. During the past few years I have, therefore, removed or destroyed such growths with my finger-nail, although previously I had occasionally made use of the circular knives of W. Meyer or Victor Lange. The method of destroying these growths with the finger-nails every eight to fourteen days, supplemented between times with proper treatment in the way of injections, etc., has given me very satisfactory results. But it cannot be denied, that the digital examination, especially if often repeated, becomes very unpleasant to the patient. I therefore thought of devising an instrument with which the remnants of these growths could be removed with less annoyance. The circular knives did not, in my opinion, answer the purpose. The instrument is composed of a flat circular knife, fastened to the end of a stiff rod, the latter bent at an angle of 45° to the handle in which it is set. The knife is of an elliptic shape, about 10 *mm.* long and 5–8 *mm.* wide; it is about 1 *mm.* thick and 1 *mm.* wide; its external edge is rounded and the inner edge bevelled, so that, on the posterior portion, its edge is like that of a sharp spoon. The insertion of this instrument behind the soft palate, the tongue being depressed with a spatula in the meantime, is hardly noticed

by the patient, even if the palate is strongly pressed against the pharynx, the soft growths being easily cut off by moving the instrument upward and downward and dropping into the pharynx.

When the operation can be done with proper rhinoscopic illumination, the eye can, of course, be used in guiding the instrument. But even when operating without illumination, the danger of injuring normal tissues (the mouths of the Eustachian tubes, for instance) is, in my opinion, much less than when using Lange's knife or other pincer-shaped instruments.

Judging from my experience, it is not always necessary to remove the very last remnants of the adenoid growths, as these often disappear during the physiological contraction of the adenoid tissue, care being taken, by proper after-

FIG. 1.—One half actual size.

treatment, that nasal respiration is possible, so that the patient sleeps with closed mouth. In many cases, in order to accomplish this, it is necessary to cauterize the lower turbinated bone, and, by means of a proper bandage, to close the mouth mechanically while the patient is sleeping. I am quite certain that a return of the symptoms caused by the adenoid growths, be they acute or chronic, otorrhœa, nasal voice, etc., etc., will not take place unless the habit of sleeping with the mouth open has again been adopted. We may, therefore, by preventing this habit by ingenious and mechanical appliances, prevent a return of the trouble—at least in many cases. But if, after the most thorough removal of these growths, mouth-breathing be indulged in, the slightest cold may cause a return of the whole cycle of symptoms.

AMSTERDAM, Sept., 1885.

A SMALL FORCEPS FOR REMOVING FOREIGN BODIES FROM THE EAR AND NOSE.

By A. GUYE, Amsterdam.

Translated by Dr. Morris L. King, New York City.

(*With a wood-cut.*)

I TAKE the liberty of describing, even at this late day, a small forceps made by Krohne in London eighteen years ago according to plans given by me. Several reasons, among others being the wish to acquire more experience in its use, led me to defer its description until the present time. In the meantime several instrument-makers have manufactured it, and it is also found in Leiter & Windler's catalogue under my name. Prof. Politzer also mentions it in his hand-book. Spencer Watson, of London, also described it, some years ago, in his book "On Diseases of the Nose," but only called it "Mr. Krohne's forceps." Later on Mr. Krohne assured me that he was not to blame in the matter. One might, therefore, assume that my forceps were quite well enough known, and for some time I was of that opinion myself. But as new instruments seem to be invented every year for the same purposes, I am forced to believe that such is not the case, and have therefore concluded to give a description and cut of the little forceps to which I allude. I have followed the old proverb, "*Nonum prematur in annum,*" and even doubled the *nonum;* I can, therefore, not be accused of haste in publishing the matter.

A case which had caused me some trouble led me to have an obstetrical forceps made in miniature. The case in question was that of a child which had got a cherry-pit in its ear,

and ineffectual attempts had been made to extract it, causing considerable swelling and inflammation of the external auditory canal. Injections were, of course, futile, and all the instruments at hand were found useless or dangerous; so I concluded to adopt expectant treatment for a few days, and to treat the inflammation by leeches and other antiphlogistic methods. After two or three days I succeeded in extracting the foreign body, and the child recovered. I could not but reflect on what I should have done had there been immediate danger, or could the patient only have been able to remain under treatment for one day, which might have been probable. All attempts with pincer-like forceps at removing round or smooth bodies whose smaller half only can be touched, will probably result in pushing the mass in farther still. Sharp hooks and other like instru-

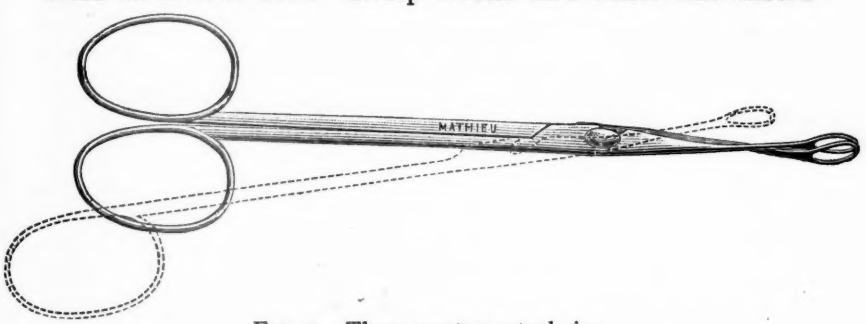

FIG. 2.—Three-quarters actual size.

ments are dangerous and useless. The only remedy in such cases would be to follow the method advised by Tröltsch, of dissecting the whole external ear from the skull, in order to get behind the foreign body and to press it out. In this way I fell into the idea of inventing a new forceps, and after it was made I experimented with it by driving cherry-pits, round pebbles, etc., with a hammer into the outer auditory canal of corpses of children, and they were all so extracted without trouble. Cases in which the foreign bodies are lodged in this degree are, of course, rare.

Later I found that my forceps could be used almost daily in less dangerous cases, even for removing plugs of tenacious cerumen. In these cases only one blade of the forceps is used as a lever, as was formerly done in labor cases. In most cases one blade is sufficient, and it is hardly necessary

to mention that it may be used in the nose and other cavities, as well as in the ear.

In removing foreign bodies, one of the greatest difficulties encountered is the fact that in only a few cases is the shape of the foreign body known. The parents often bring another object along which is said to be similar to the one in the ear, but such statements are unreliable. A child was once brought to me in this way with a glass bead in the ear, another one being shown which was said to be like it. This bead was an ordinary, large cylindrical bead; but after I had removed the one in the ear it was found to be a sharp, many-sided pyramid, with a fine hole through its base. This bead, therefore, was of such a shape that it could hardly be grasped with a forceps without slipping and passing farther into the ear, while this would not be the case with a cylindrical bead, the latter being easily grasped with the forceps. On another occasion I removed from the nose of a boy a smooth porcelain knob the shape of a perfect segment of a sphere, which could not be grasped at all with the forceps, vain attempts having already caused considerable damage to the nasal mucous membrane. Neither the patient nor his father had any idea as to the shape of the body. I might mention a number of instances in which the forceps have been useful—I might even say indispensable. More minute description of the instrument is unnecessary, as all necessary ideas can be derived from the cut, which is three-quarter size, and for which I am indebted to Mr. Mathieu.

In order to show to what degree experienced aurists and surgeons are convinced of the dangerous character of pincers and other instruments for the removal of foreign bodies, I would simply mention that Jonathan Hutchinson once told me that he discarded all instruments made for this purpose and only used a thin wire bent in the shape of a loop, which latter he endeavored to place behind the body and extract it. Furthermore, Löwenberg has, as is well known, advised the use of a brush dipped in melted glue, leaving it for several hours until the glue has become hard. Properly used, my forceps is not more dangerous than Hutchinson's

wire loop, and it is not necessary to use so much patience, both on the side of the physician as well as patient.

My experience, as well as that of others, has shown that it is difficult to get an exaggerated idea of the danger of pushing such bodies farther into the ear by means of pincers, etc. One fact should always be remembered, and that is that, in most cases where foreign bodies have been introduced into the ear, the organ was not in normal condition. The introduction of the foreign body is almost always caused by abnormal sensations, such as startings, pain, buzzing, and often there has been a perforation of the drum or chronic otorrhœa. I remember in one case, in which I very carefully removed a dry pea by syringing, that on examining the ear to see whether the tympanum was normal, I found a large, sharp fragment of a plum-pit present, which I removed. On closer examination I found a perforation, with otorrhœa, which may have been present a long time. It is hardly necessary to state that the slightest mechanical force used in this case might have been followed by results which later on might have caused trouble.

AMSTERDAM, *Sept.*, 1885.

THE TREATMENT OF DISEASES OF THE MIDDLE-EAR BY MEANS OF LUCAE'S PRESSURE-PROBE.

By A. EITELBERG,

AURAL SURGEON TO THE GENERAL POLICLINIC, VIENNA.

Translated by Dr. J. B. McMAHON.

LUCAE [1] has recently proposed a new procedure in the treatment of that large group of diseases of the sound-conducting apparatus, which are collectively termed "chronic middle-ear catarrh." It consists of the use of the spring pressure-probe (federnde Drucksonde), as Lucae calls the instrument, in making piston-like movements of the short process of the malleus by which, in suitable cases, the rigidity of the chain of small bones will be mechanically removed. According to Lucae, the treatment by means of the probe is adapted only for the cases in which *Rinne's experiment proves negative in connection with marked diminution of hearing for speech* and other symptoms of disease of the sound-conducting apparatus. I draw special attention to this because it explains—at least in part—why the results obtained by me do not agree with those reported by Lucae. I have not restricted myself by those conditions, but have employed this method of Lucae in a much wider range of diseases of the auditory organs, and even in cases, few, indeed, of unquestionable disease of the sound-perceiving apparatus.

The histories of these cases will show, that even in them a good result may be obtained; though, of course, but tem-

[1] *Arch. f. Ohrenheilk.*, vol. xxi., pp. 84–91.

porary. Rinne's test was not employed in all the cases, and no attention was paid to the result, whether positive or negative. I am satisfied, however, that the reader will easily form a judgment, from the data given in the histories of the individual cases, as to whether the peripheric or the central part of the auditory apparatus was at fault. Moreover, Lucae himself does not lay any special stress on the importance of the Rinne test; and quite lately, Schwabach,[1] in a very valuable article, has shown that "Rinne's experiment, with the limitation suggested by Lucae—markedly diminished appreciation of speech—affords an excellent means of making the differential diagnosis between affections of the sound-conducting and of the sound-perceiving apparatus; yet it cannot be regarded as a reliable test in all cases."

The instrument used in these investigations was a "spring pressure-probe," made by Marcine, after the drawing and description given by Lucae. I have since had the handle of the instrument bent at an obtuse angle. The operation was in all cases performed without any assistance, and I confined myself to one or two strokes at the first sitting, or sometimes employed up to ten, according to the sensibility of the individual patient. I operated on adults only.

I have thus far treated about thirty cases after Lucae's method, but report only twenty, because in the other ten preliminary experiments merely were made and no accurate notes made of the results; and, again, in these latter, the statements made by the patients seemed to me not always trustworthy.

The cases observed closely are as follows:

Case 1.—Mary B., æt. thirty, has suffered since the birth of her last (fourth) child, a half year ago, from continuous tinnitus, especially in the left ear. Drum-membranes seem normal, moderate naso-pharyngeal catarrh, slight narrowing of the isthmus tubæ (admits a bougie $\frac{3}{4}$ *mm.* in diameter). Tuning-forks of high and low pitch are heard on both sides equally well by bone and by aërial conduction. Watch, 1 *cm.*[2]

[1] *Zeitschrift f. Ohrenheilk.*, Bd. xiv., pp. 61–148.

[2] My watch is normally heard at 6 metres distance.

Sept. 18, 1884.—After use of the probe (2 strokes) the tinnitus diminishes on the left side ; five minutes later, the improvement has not disappeared.

Sept. 25th.—According to report of patient, the improvement noticed when last treated proved of short duration. The use of the probe to-day makes the head freer but the tinnitus is lessened only on the use of Politzer's method.

Sept. 27th.—Tinnitus no better. Diminished after catheterization. Probe not used.

Oct. 2d.—Patient has suffered from severe pain in both ears for the past two days. On the left side are seen the signs of acute myringitis. Induced current employed.

Oct. 4th.—The inflammation of the drum-membrane has almost disappeared ; in the region of the left processus brevis mallei, however, a granulation of the size of a pinhead is noticed. Politzerization.

Oct. 6th.—Granulation has disappeared. Severe bilateral tinnitus and headache. Watch, R, 2 *cm.* ; L, 10 *cm.* After use of the pressure-probe, headache less, tinnitus undiminished. Watch : R, 8 *cm.* ; L, 7 *cm.*

Oct. 17th.—Yesterday the tinnitus was trifling, to-day it is somewhat more severe. Watch : R, 10 *cm.* ; L, 12 *cm.* After use of the pressure-probe, tinnitus less. Watch : R, 10 *cm.* ; L, 17 *cm.* Inflation of the middle-ear produced no further improvement.

Oct. 27th.—For the past five days there has been left-sided otorrhœa with considerable earache. Perforation in the anterior lower segment of the drum-membrane.

Case 2.—Joseph H., æt. thirty-seven. Patient had suffered for several years from bilateral otitis purulenta with formation of polypi. These had been removed by means of Wilde's snare. The long-continued suppuration has left no noteworthy traces in the left drum-membrane ; the hearing on this side has also remained relatively good. Patient has had severe pain in the left ear for three days ; to-day (Sept. 22, 1884) he has occasional piercing pains. There is congestion along the handle of the malleus and in the upper part of the periphery of the drum-membrane. The watch is heard at a distance of 1 *cm.* from ear and also through the mastoid process. After use of the pressure-probe, the ear, which had felt stuffed, became freer. The piercing pain complained of during the examination, entirely disappeared.

Sept. 23d.—Only slight redness of the left drum-membrane.

Ear free. On the other hand, the patient complains of the same dulness in the right ear, and the right drum-membrane presents the same appearance noticed yesterday on the right side. The use of the pressure-probe was productive of the same results as before, but it also caused a trifling hemorrhage of the swollen and congested membrane in the neighborhood of the short process.

Sept. 24th.—Left drum-membrane now normal. Right shows some slight redness. Air douche. Two days later patient was discharged cured.

CASE 3.—Anna Kn., æt. twenty-five. For some years, hardness of hearing and continuous tinnitus on both sides. Cause unknown. Drum-membrane somewhat retracted, tube of normal calibre (admits a bougie of $\frac{4}{5}$ *mm.* diameter easily). All the tuning-forks were well heard in front of the ear and through the bones on both sides. Watch : R, 2 *cm.* ; L, 1 *cm.*

Sept. 24th.—The use of the pressure-probe causes a relief of the tinnitus, lasting one hour.

Oct. 3d.—Pressure-probe used with the same results as on the last trial.

Oct. 6th.—Tinnitus steadily diminishing, though not in the same degree noticed immediately after treatment. Watch : R, 8 *cm.* ; L, 4 *cm.* After use of the probe, R, 24 *cm.* ; L, 16 *cm.*

Oct. 10th.—Tinnitus continues less marked. Watch, 17 *cm.* on both sides. After use of the probe, tinnitus still further diminished ; watch, 17 *cm.* on both sides.

Oct. 13th.—After the last treatment, the improvement lasted a full hour. Even to-day it has not reached its original intensity. Watch : R, 12 *cm.* ; L, 15 *cm.* On use of the probe, still further diminution of the subjective symptoms.

Oct. 15th.—The improvement under last application remained an hour. At present the tinnitus is only moderate. Watch, 10 *cm.* on both sides. After use of the probe, watch : R, 11 *cm.* ; L, 14 *cm.*

Oct. 17th.—Tinnitus moderate. Watch : R, 10 *cm.* ; L, 17 *cm.* After use of the pressure-probe, watch : R, 16 *cm.* ; L, 21 *cm.* Politzerization produced a still further improvement of 2 *cm.* in the hearing on the right side.

Oct. 20th.—Condition satisfactory, as regards subjective auditory symptoms. Watch : R, 18 *cm.* ; L, 20 *cm.* After use of the probe, watch : R, 25 *cm.* ; L, 30 *cm.*

Oct. 24th.—Patient had two attacks of vertigo after the last

treatment, one on the way home from the Policlinic; the other, some 1½ hours later. Patient denies positively having had any previous attacks of the kind. Tinnitus increased. Watch, on both sides, 12 *cm.* After using the probe, a considerable temporary diminution of the tinnitus, which returns later on, almost to its former severity. The hearing for the watch was not improved.

After the last treatment, the subjective symptoms soon assumed their original intensity. Watch: R, 5 *cm.*; L, 10 *cm.* After using the probe, watch: R, 9 *cm.*; L, 15 *cm.* Tinnitus less. The ear is said, by patient, to feel clearer. After catheterization, tinnitus still more improved. Patient now hears the watch at a distance of 10 *cm.* from the ear, on the right; 22 *cm.*, on left side.

Nov. 5th.—After the last treatment, on reaching home, patient developed a tinnitus of such intensity that she became almost completely deaf for speech. This condition, so unpleasant to both the patient and her companions, lasted the entire evening. To-day, also, the tinnitus is very marked, and is diminished only by the treatment with the probe and subsequent use of the catheter. Hearing for the watch, which had been before the treatment 10 *cm.*, on both sides, was not affected by the use of the probe, but was improved, by catheterization, to 13 *cm.*, on both sides.

Nov. 7th.—Tinnitus as bad as ever one hour after treatment. On the 5th inst., watch was heard at 3 *cm.* right, 4 *cm.* left. After use of the probe, tinnitus less, watch: R, 5 *cm.*; L, 3 *cm.* No further improvement in the subjective symptoms occurs after inflation by means of the catheter; the watch, however, is heard at 6 *cm.* right, 7 *cm.* left.

Nov. 24th.—Tinnitus severe. Loud speech is heard with greater difficulty than before. Watch, both sides, 5 *cm.* After use of the probe, tinnitus diminished, especially on the left side. Watch: R, 4 *cm.*; L, 3 *cm.* After catheterization, tinnitus remains the same, whilst the hearing has improved: R, 10 *cm.*; L, 11 *cm.* Between Nov. 7th and Nov. 24th, patient had a third attack of vertigo. I may mention here, that the sensibility to the use of the probe, which at first was present in a high degree, gradually diminished; and, at the last sitting, the patient stated that the movements of the probe (ten to twelve in number) caused her absolutely no pain.

Case 4.—John R., æt. thirty-four, presented himself for treatment in the early part of September, last year. He com-

plained of hardness of hearing and continual tinnitus (like the rushing of water) in the left ear. Deep in the auditory canal were found colored masses which, in appearance, resembled the aspergil. nigr. The diagnosis was not confirmed by microscopic examination. The condition was rather due to a desquamative process in the drum-membrane and the inner third of the canal. By repeated use of the syringe, and instillations of spirit. vini rectif., the diseased parts regained their normal condition. The unpleasant symptoms, which had induced the patient to seek medical aid, continued, however, without abatement. A more careful examination of the patient resulted as follows : Pupils unequal, right wider than left. (Patient has had right-sided myopia from childhood.) Left pupil distorted above from a synechia, the result of an old syphilitic iritis. Simultaneous with the affection of the eye, the patient had a syphilitic eruption. The syphilitic manifestations disappeared under the use of innunctions of mercurial salves and the internal use of iodide of potash. The tones of the tuning-fork were not heard in the diseased ear from the forehead or mastoid process. They were, however, heard from the teeth and by aërial conduction. On closing the external canal of the left (diseased) ear, the tuning-fork was heard in it by bone-conduction also. Isthmus tubæ, left side, of normal calibre. Watch : L, 1 *cm.* Pressure-probe used for the first time on Sept. 18th, with the result of considerable diminution of the tinnitus for a few moments ; watch, 5 *cm.*

Sept. 20th.—Tinnitus only slight yesterday afternoon and this morning. Now (4 P.M.) it is again violent. No improvement in the subjective symptoms follows the use of the probe ; air-douche (by catheter) equally inefficacious.

Sept. 27th.—For a few days the tinnitus has been less. No immediate improvement found on use of the probe ; catheterization likewise without result.

Sept. 29th.—Tinnitus less ; hearing for speech better. Catheterization. Pressure probe not used. An examination made with tuning-forks to-day gives results somewhat at variance with those noticed at the first examination. The forks of high and low pitch are heard in the diseased (left) ear from the left mastoid process and the high tones are heard from the brow only in the right ear.

Sept. 30th.—Tinnitus stronger. Condition unchanged after use of the catheter. Temporary improvement follows the use of the pressure probe.

The history of this case, which was treated for months in this manner and always showed the same results, would, if reported in full, be an endless, monotonous repetition of the notes already given. I shall content myself with a short résumé of the history. As a rule, no favorable result followed immediately the use of the probe ; when an immediate improvement did show itself, it was of such short duration as to allow the patient scarcely enough time to state so in words. Both the subjective sensations and the hearing for speech, however, were unmistakably better on the morning following the treatment, whilst the hearing for the watch varied between 4–6 *cm.* during the whole period the patient was under observation. Taken all in all, the case can be said to show an improvement ; the tinnitus, which had been an excessive annoyance to the patient, is now of moderate intensity, and has had occasional complete intermissions, lasting one or two hours.

Case 5.—John J., æt. twenty, has suffered for four days from severe pain in the left ear and the corresponding side of the head. Tuning-fork always heard better in the diseased ear from the brow and both mastoid processes. Watch : L, 1 *cm.* The vessels along the handle of the malleus, as also the radiating vessels of the membrana, are markedly injected. The epidermis of the drum-membrane is swollen, the membrane itself is opaque. After the use of the pressure-probe (Sept. 29, 1884) the pain in the left side of the head entirely disappeared, the pain in the ear was considerably diminished. The light humming in the ear which was present before the treatment, but which caused the patient almost no annoyance, was not improved. The tuning-forks were heard the same as before the use of the probe. Watch : L, 4 *cm.* The vascular injection along the handle of the malleus seems less marked. The air-douche was not used in this case. The noteworthy improvement is therefore to be attributed solely to the use of the pressure-probe. Unfortunately the patient did not present himself for further treatment and I am, therefore, not in a condition to state whether the result was permanent.

Case 6.—Fred. I., æt. thirty, appeared at the Policlinic on Oct. 1, 1884. He complained of hardness of hearing and continuous noises in the left ear. The drum-membrane shows nothing abnormal save a slight retraction. Tube of normal calibre. All the tuning-forks were heard by bone-conduction better in the left than in the right. Watch : L, 6 *cm.* After use of the pressure-probe, tinnitus somewhat better for a few minutes. Watch : L, 6–7 *cm.*

On *Oct. 2d.*—Tinnitus not affected by the air-douche (catheter); temporarily improved by the use of the pressure-probe. Considerable injection of the vessels of the malleus and ecchymosis of size of a lentil on the drum-membrane behind and somewhat above the level of the umbo. The patient did not return for further treatment, and so I could not follow the further course of the case. The ecchymosis in this case cannot well be attributed to a maladroit use of the instrument; it was rather due to the fact that the drum-membrane was exposed to an unusual mechanical irritation repeated at too short an interval.

Case 7.—Marie M., æt. 45. Deafness and continuous tinnitus in both sides. Understands loud speech only when spoken directly into ear. Drum-membrane retracted, slightly atrophic. Tubes somewhat constricted (isthmus of the tube admits a bougie $\frac{3}{3}$ *mm.* in diameter). Tuning-forks of high and of low pitch are heard very poorly, both by aërial and bone-conduction; relatively better on the right than on the left. Watch: R, o; L, *ad concham.* After use of the pressure-probe (Oct. 6, 1884), tinnitus unaltered on right, diminished on left side. Watch: R, o; L, 2 *cm.*

Oct. 7th.—Violent tinnitus. Watch: R, o; L, 1 *cm.* Bougies passed through both tubes. Watch: R, o; L, 1 *cm.* After use of the pressure-probe, tinnitus less on right side. Watch, *ad concham*, both sides.

Oct. 9th.—Tinnitus as usual. Watch, o, both sides. After use of the pressure-probe, tinnitus somewhat diminished on right side. Watch: R, o; L, *ad concham.*

Oct. 10th.—Tinnitus marked. Watch, o, both sides. After use of bougies, tinnitus and hearing remain the same. After use of the pressure-probe, tinnitus temporarily better on both sides. Watch, o, both sides.

Oct. 13th.—After use of the pressure-probe, which to-day has caused considerable pain, tinnitus temporarily diminished. Watch, o. On the left side, small ecchymosis in the region of the processus brevis.

Oct. 14th.—The high-pitched tuning-forks are heard only from the mastoid process in the ear of the same side; the low-pitched forks on the other hand are heard from the forehead in both ears, but better in the right than in the left. Watch, o, both sides. After Politzerization (pressure-probe not used), condition unaltered.

Oct. 17th.—Pressure-probe not used, as patient complains of pain in both ears, and objects to its employment to-day. There is moderate injection of the handle of the malleus. The ecchymosis on left side has disappeared. Tinnitus and hearing not affected by the use of Politzer's experiment.

Oct. 20th.—After use of the pressure-probe, the tinnitus is somewhat diminished. Watch, both sides, 0. Subsequent use of the catheter produced no further improvement in the subjective auditory symptoms. The hearing was also unimproved.

Oct. 21st.—Tinnitus very violent. Frontal headache. Watch, both sides, 0. On attempting to inflate the ears after using bougies in the tubes, a slight emphysema was produced that disappeared after evacuation of the air by incisions into the uvula and massage of the neck. In this case the most different methods of treatment were employed without producing any more than a momentary relief of the truly lamentable condition of the patient.

Case 8.—Mary L., æt. twenty, was treated with the pressure-probe for the first time on Oct. 9, 1884. She had been attending the aural division for fourteen days previous to this, and had been bougied for stenosis of the left Eustachian tube. In the left ear there is continuous tinnitus and hardness of hearing. Membrana tymp. retracted, moderately thickened. All the tuning-forks are heard from the brow, and both mastoid processes better in the left ear. Watch: R, 7 *cm.*; L, 6 *cm.* After use of the pressure-probe (in left ear only), tinnitus unchanged. Watch: R, 7 *cm.*; L, 8 *cm.*

Oct. 10th.—Tinnitus has remained the same on the left. Watch: R, 4 *cm.*; L, 7 *cm.* After use of the probe on both sides, watch: R, 11 *cm.*; L, 7 *cm.* It was a matter of some surprise that the tinnitus was not improved by the use of the probe on the left side; but diminished when the instrument was used also on the right, in which no tinnitus existed. I must regret that I could not control this case further, as the patient did not return for further treatment. From the data here presented, it is to be seen that on the preceding day when the pressure-probe was used on the diseased left ear only, there was also no improvement.

Case 9.—Theresa B., æt. twenty-four, has suffered for one year from continual tinnitus (sounds of water boiling, and whistling) in the left ear. Both drum-membranes present a normal appearance. The light spot is broken on the right membrane. Tuning-forks of high and of low pitch are heard from the forehead better on

the right side, from in front of the ear equally well on both sides. Watch, both sides, 10 *cm.* Patient has already been three months under treatment, but thus far has experienced no positive improvement. On Oct. 13, 1884, for the first time, the pressure-probe was used, three strokes being made. Considerable mobility of the drum-membrane was thus demonstrated. Passing attack of dizziness. On the drum-membrane no reaction was perceptible save a slight injection along the handle of the malleus. Tinnitus unchanged. Watch, both sides, 10 *cm.*

Oct. 17th.—Yesterday was merely catheterized. Since then the tinnitus has been weaker and of a changed character; instead of the cooking, and whistling sounds, there is a measured beat. Watch, both sides, 10 *cm.* Afrer use of the pressure-probe, tinnitus and hearing for the watch unchanged. After use of Politzer's method, condition is the same.

Oct. 31st.—Tinnitus the same as before. "The noise, taken all in all is diminished, but springs up now and again." Watch: R, 17 *cm.*; L, 12 *cm.* After use of the probe, on the right side only, tinnitus temporarily better. Watch: R, 8 *cm.*; L, 19 *cm.* After catheterization, tinnitus unchanged. Watch: R, 10 *cm.*; L, 12 *cm.*

Nov. 3d.—Condition unaltered. Watch, both sides, 12 *cm.* After use of the pressure-probe, a passing attack of vertigo, tinnitus the same. Watch, both sides, 9 *cm.* After air-douche with catheter, on right side only, tinnitus sensibly diminished. Watch, both sides, 12 *cm.*

Nov. 5th.—Tinnitus more severe since yesterday. Watch: R, 6 *cm.*; L, 8 *cm.* After use of the pressure-probe a passing attack of vertigo. Tinnitus and hearing for watch unchanged. After use of catheter on right side, tinnitus the same. Watch: R, 12 *cm.*; L, 9 *cm.*

Nov. 8th.—Tinnitus remains the same. After air-douche with catheter, tinnitus unaltered. Watch: R, 14 *cm.*; L, 22 *cm.*

Case 10.—Theresa Gr., æt. thirty-seven, has been hard of hearing, and has had constant tinnitus in the right ear since 1880, and in the left since last summer. Drum-menbranes retracted, thinned. Posterior folds strongly marked. Mucous membrane hypertrophic. Moderate stenosis of the isthmus of the tubes, admitting a bougie $\frac{3}{5}$ *mm.* in diameter. Naso-pharyngeal catarrh. The tuning-forks of high pitch are heard from the forehead in the right ear only. Low-pitched ones are heard only from the

mastoid processes, and then only in the right ear. On the other hand, the patient hears the tuning-forks in the left ear by aërial conduction. Watch : R, 0 ; L, 1 *cm.* After use of the pressure-probe for the first time, Oct. 15, 1884, tinnitus on right side unchanged ; on the left, where it as a rule had been less marked, it was completely relieved. Watch : R, 0 ; L, 1 *cm.*

Oct. 17th.—After the last treatment, the tinnitus remained absent on the left side for about a quarter hour, and then resumed its former intensity. Watch : R, 0 ; L, 1 *cm.* To-day, after use of the probe, tinnitus much diminished on both sides. Watch : R, 0 for several seconds, afterwards *ad concham ;* L, 1 *cm.* After the employment of Politzer's method, tinnitus and hearing unaltered.

Oct. 20th.—Tinnitus in left ear decidedly less, but there is a sticking pain without any objectively recognizable cause. After use of the pressure-probe, tinnitus on right side unchanged, on left sensibly less. Hearing for the watch the same. After catheterization tinnitus is diminished still further ; condition otherwise the same.

Oct. 22d.—Tinnitus in general improved. After use of the probe, tinnitus diminished. Hearing for watch the same.

Oct. 24th.—Tinnitus unchanged on right side, on left side weaker. Yesterday, however, it was very severe in left ear. Watch : R, 0 ; L, 3 *cm.* After use of the probe, tinnitus in right diminished, on left entirely gone. Watch : R, 0 ; L, 3 *cm.*

Oct. 27th.—Since last treatment, tinnitus has continued to be less severe. To-day, also, after use of the pressure-probe and the passing of bougies, the tinnitus is further diminished.

Oct. 30th.—After last treatment the tinnitus remained moderate till 9 P.M.—*i. e.*, for four hours, and then resumed its original intensity. After catheterization, tinnitus unaffected. After use of the pressure-probe, tinnitus less on left, unchanged on right side.

Nov. 3d.—Tinnitus a trifle less than at last sitting. Watch : R, 0 ; L, 2 *cm.* After use of the probe, tinnitus shows some improvement. Watch : R, 0 ; L, 3 *cm.* After use of bougies, further improvement of the tinnitus. Watch : R, 0 ; L, 1 *cm.*

Nov. 7th.—Patient to-day is not satisfied with her condition. The tinnitus is of varying intensity, but again is on an average worse. Watch : R, 0 ; L, 2 *cm.* After use of the pressure-probe, tinnitus improved particularly on left side. Watch : R, 0 ; L, 2 *cm.*

Nov. 14*th.*—Tinnitus somewhat less. It seems to be increased by the use of bougies in the tubes. Watch : R, 0 ; L, 2 *cm.* After use of the pressure-probe, tinnitus, right side, diminished ; left, entirely ceased. It appears to the patient that lately the use of the probe causes a scarcely noticeable pain ! From this time on there was no improvement to be noted ; on the contrary, the condition of the patient steadily deteriorated. It scarcely needs mention that in this case, as in all others, the existing naso-pharyngeal catarrh received suitable treatment.

CASE 11.—Rosa N., æt. thirty-six, presented herself at the Policlinic for the first time Oct. 16, 1884. She states that she has had continuous tinnitus in the right ear for two years, and intermittent tinnitus in the left since last summer. The hardness of hearing is, correspondingly, more marked on the right side than in the left. On ocular inspection, is noticed on both sides a transparent retracted drum-membrane, with congestion of the tympanic mucous membrane. Tuning-forks of high and low pitch are heard from the forehead better in the right ear ; from before the ear, by aërial conduction, better in the left. Watch : R, 2 *cm.* ; L, 10 *cm.* On inflation by means of the catheter, the tinnitus in the right ear was diminished. On use of the pressure-probe, the tinnitus, right side, ceased almost entirely. Watch : R, 3 *cm.* ; L, 10 *cm.*

Oct. 21*st.*—The improvement in the tinnitus at the last treatment lasted half an hour. Watch : R, 7 *cm.* ; L, 13 *cm.* After using the pressure-probe in the left ear, the tinnitus in this and also in the right, the poorer ear, became considerably less. After the probe was used in the right ear the tinnitus stopped entirely. Watch : R, 19 *cm.* ; L, 12 *cm.* Ten minutes later, there was a return of tinnitus, but in a much less severe degree than before.

Oct. 23*d.*—On left side tinnitus has entirely ceased ; on the right the tinnitus is constant but much less marked than before. After use of the pressure-probe on the left side, the tinnitus in the right ear became less, and there was no further improvement when the instrument was employed on the right side. Watch : R, 12 *cm.* ; L, 10 *cm.* Fifteen minutes later, the tinnitus is still the same as immediately after the treatment.

Nov. 3*d.*—Tinnitus again as bad as originally. Watch : R, *ad concham* ; L, 7 *cm.* After use of pressure-probe on left side, the tinnitus in the right as well as in the left ear was considerably diminished. The repetition of the procedure in the right ear pro-

duced no further improvement. Watch : R, 1 *cm.* ; L, 7 *cm.* After use of bougies in the Eustachian tubes (the isthmus tubæ admits a bougie $\frac{3}{3}$ *mm.* in diameter), the tinnitus remained unchanged. Watch : R, 2 *cm.* ; L, 7 *cm.*

Nov. 12*th.*—For six days patient has suffered from dizziness which comes on after any violent movement, especially in stooping. Congestion of the drum-membrane. Tuning-forks heard from the forehead only in the right ear ; from the mastoid process in the ear of the same side ; by aërial conduction better in the left than in the right. Watch : R, 0 ; L, 9 *cm.* After use of the probe on the left side only, tinnitus in right ear diminished. No improvement follows the repetition of the procedure on the right side. Watch : R, 0 ; L, 9 *cm.*

Nov. 17*th.*—Dizziness slight. Tinnitus in right ear remains unchanged ; in left ear, is noticeable only at intervals. The hyperæmia of the drum-membrane noticed last time has disappeared. Watch : R, 0 ; L, 6 *cm.* After use of the pressure-probe on left side, tinnitus in right ear weaker. The use of the same procedure on the right side did not affect the tinnitus further. Watch : R, 0 ; L, 10 *cm.* The use of the bougies produced no improvement either in the tinnitus or in the hearing for the watch.

Case 12.—Aloysius F., æt. twenty-two, appeared on Oct. 20, 1884, in the Policlinic, complaining of constant, severe pain in the left ear for some days. The results of examination are as follows : On right side a large perforation involving the lower half of the drum-membrane ; the tympanic mucous membrane very red but dry. (The inflammatory process here must have begun in May, a year ago.) On left side, drum-membrane opaque and retracted ; in the upper posterior segment a crescentic deposit of lime salts. (In this ear, an inflammatory process has never taken place.) No tinnitus. Tuning-forks heard from the forehead better on the right side, by aërial conduction better on the left. Watch : R, 7 *cm.* ; L, 20 *cm.* From the absence of any sign of inflammation and from the presence of a decayed tooth in the lower jaw, the diagnosis of otalgia from dental caries was made. By way of experiment, I employed the pressure-probe on the left side in this case, too. The pain, which was as "severe as a toothache," disappeared, leaving in its stead a pleasant tickling sensation. Watch : R, 8 *cm.* ; L, 30 *cm.* After Politzerization : R, 12 *cm.* ; L, 22 *cm.*

Oct. 22*d.*—The pain became very violent last night and was relieved only on the extraction of the carious tooth as had been recommended.

CASE 13.—Fanny H., æt. thirty-four, complains of deafness, of more than one year's duration. There is very seldom tinnitus, perhaps once a month, and then lasting but a short while. Examination shows extensive calcareous deposits in both drum-membranes, and between these thinned membrane. Patient cannot recall the existence at any previous time of a purulent otitis. Bougies do not disclose any narrowness of the Eustachian tubes. Tuning-forks heard from the forehead and also from both mastoid processes, in the left ear only. From before the right ear, tuning-fork heard distinctly ; before the left ear, faintly. Watch: R, 32 *cm.* ; L, 4 *cm.* After use of the pressure-probe for the first time, Oct. 20, 1884. Watch : R, 37 *cm.* ; L, 4 *cm.* Patient feels on the left side as if cool air were coming through the ear. Tuning-forks now heard well on the left side by aërial conduction.

Oct. 21*st.*—Watch: R, 37 *cm.* ; L, 4 *cm.* Condition the same after use of the probe. After catheterization, watch : R, 30 *cm.* ; L, 4 *cm.* Auscultation sounds weak.

Oct. 23*d.*—Watch : R, 30 *cm.* ; L, 4 *cm.* No changes upon the use of the probe and catheter.

Oct. 29*th.*—A two per cent. solution of cocaine was poured into the external meatus and allowed to remain without producing any anæsthetic effect on the drum-membrane in the region of the short process.

Oct. 31*st.*—Watch : R, 34 *cm.* ; L, 4 *cm.* After use of the pressure-probe, watch : R, 40 *cm.* ; L, 4 *cm.* Patient has a pain in right side of head lasting some minutes. At the last sitting also, she had a similar headache after use of the probe.

Nov. 3*d.*—Watch : R, 28 *cm.* ; L, 4 *cm.* After use of the probe. watch : R, 28 *cm.* ; L, 4 *cm.* Passing headache. Tubes bougied, Watch : R, 34 *cm.* ; L, 4 *cm.*

Nov. 5*th.*—Watch : R, 20 *cm.* ; L, 5 *cm.* After use of the pressure-probe, hearing distance for watch the same. After use of bougies, watch : R, 23 *cm.* ; L, 6 *cm.*

Nov. 7*th.*—Watch : R, 18 *cm.* ; L, 3 *cm.* After use of probe, *status idem.* No headache.

Nov. 10*th.*—Watch : R, 13 *cm.* ; L, 7 *cm.* After use of the probe, watch : R, 13 *cm.* ; L, 2 *cm.*

Patient has been under treatment since. There have been no changes in her condition worthy of notice. For the sake of experiment, bougies were passed a few times, though in this case there was no proper indication for the procedure.

CASE 14.—Theresa H., æt. sixty-six, has had ear-trouble since 1880. She complains of very severe continuous tinnitus and hissing in the occiput and vertex, so that her sleep is interfered with and she leaves the bed in the morning all perplexed. There is also continuous headache. Both drum-membranes strongly retracted with well-marked posterior folds and indistinct cone of light. Tuning-forks of high and of low pitch are heard from the forehead equally well in the two ears ; from the mastoid process, they are heard in the ear of the same side. By aërial conduction, the tuning-forks were heard equally well on the two sides. The isthmus of the tubes admits with ease a bougie $\frac{1}{3}$ *mm.* in diameter. Watch, both sides, 4 *cm.* After use of the pressure-probe for the first time, Oct. 21, 1884, diminution of the tinnitus and headache.

Oct. 22d.—Headache less, tinnitus more severe. After use of the probe, tinnitus somewhat less ; the headache, particularly in the vertex, is diminished still further.

Oct. 28th.—Since last treatment, the headache has remained less severe, but the tinnitus has resumed its former intensity. After use of the probe, the tinnitus is a little less marked, the hearing for the watch unchanged.

Oct. 30th.—Both headache and tinnitus better. The use of the pressure-probe is followed by improvement of the annoying symptoms.

Nov. 6th.—No increase of headache or tinnitus. Watch, both sides, 5 *cm.* Headache and tinnitus further improved on use of the probe. No change in hearing for the watch.

Nov. 11th.—Headache and tinnitus very severe. It deserves special mention here that this patient, who was very nervous and sensitive, bore the use of the probe remarkably well.

CASE 15.—John M., æt. sixty-one, has been under treatment at the Policlinic continuously for many years.

Both drum-membranes thickened and, according to the results of the combined manometric examination, immobile. High- and low-pitched tuning-forks are heard from the forehead only in the left ear ; from the mastoid process in the corresponding ear. Perception of tuning-forks by aërial conduction much diminished. Tubes completely free. Watch, both sides, 0. The use of the pressure-probe for the first time, Oct. 22, 1884, causes a diminution of the tinnitus, but no improvement of the hearing.

Oct. 25th.—On the day before yesterday, although the weather

was bad, and this had previously caused an increase in the subjective symptoms, the tinnitus was present in a less degree than at any time for two years. Since yesterday the tinnitus has again increased, but yet is not of the same severity as on the day of the first application of the probe. Watch, both sides, 0. On use of the pressure-probe, the tinnitus was a little improved; the hearing for the watch remained the same.

Oct. 31st.—After the last treatment, the tinnitus was for two days considerably better. The vessels along the handle of the right malleus appear injected. A two per cent. solution of cocaine, poured into the ear and allowed to remain seven minutes, does not diminish in the slightest degree the sensitiveness to the use of the probe; the injection of the vessels of the malleus is likewise not affected. The probe itself causes an improvement in the subjective noises.

Nov. 3d.—The tinnitus has remained less since the last treatment. Watch, both sides, 0. On the use of the pressure-probe, the tinnitus is diminished still further. Hearing for watch unchanged. On the right side small ecchymoses are seen on both sides of the malleus. Patient now absents himself from treatment. This patient presents a contrast to the preceding one in that a man specially robust for his age found the application of the probe very painful.

Case 16.—Leopoldine D., æt. eighteen, presented herself for the first time on Oct. 25, 1884. The patient in her childhood suffered from a purulent otitis, right side, leaving a centrally situated cicatrix of the drum-membrane. The rest of the membrane is opaque, strongly retracted, the light spot reduced to a small, indistinct point. Patient states that she has had occasional severe pains in the ear for eight days. The tuning-forks are heard from the forehead and mastoid processes better in the right. In the examination for perception by aërial conduction, the right ear proved better than the left. Hearing for the watch about the same on both sides (20 *cm.* or so). During the examination patient had severe headache. This disappeared entirely on use of the probe.

Oct. 28th.—The headache, which previously used to appear daily, has not returned since last treatment. A like effect was not again attained, though the patient was submitted repeatedly to the application of the probe.

Case 17.—Aaron M., æt. twenty-six, states that two years ago

he received a blow on the head, and since then he has had a continuous roaring in the ears. On the left side, in the anterior superior quadrant of the drum-membrane, is a calcareous deposit of the size of a pin's head, and in the posterior lower quadrant a small cicatrix. On the right side the drum-membrane shows several opaque patches. There is tubal catarrh, with objectively recognizable noises when the patient swallows. Well-marked naso-pharyngeal catarrh. Tuning-forks of high pitch are heard from the forehead and mastoid processes on the right side only; those of low pitch are heard from the forehead in the left half of the head, and from the mastoid processes in the corresponding ear. Watch: R, 20 *cm.;* L, 16 *cm.* Patient has been bougied for a considerable length of time (isthmus tubæ admits a bougie $\frac{3}{3}$ *mm.* in diameter), and also catheterized, without experiencing any improvement. The naso-pharyngeal catarrh has, as usual, been subjected to treatment. After use of the pressure-probe for the first time, on Nov. 4, 1884, tinnitus less. Watch, both sides, 34 *cm.*

Nov. 7th.—According to the statement of the patient the tinnitus on the night following the first use of the probe was slight. Watch: R, 50 *cm.;* L, 95 *cm.* After use of the probe, tinnitus and hearing for the watch unchanged.

Nov. 14th.—Tinnitus as before. Watch: R, 44 *cm.;* L, 60 *cm.* After use of the pressure-probe, tinnitus somewhat stronger. Watch: R, 74 *cm.;* L, 80 *cm.* Patient has made the observation that the improvement in the subjective symptoms usually appears some time after the application of the probe, whilst with the bougies the relief was immediate, but of short duration.

Nov. 20th.—Tinnitus steadily less. Watch: R, 70 *cm.;* L, 90 *cm.* After use of the probe, tinnitus still further improved. Watch: R, 70 *cm.;* L, 90 *cm.* The patient, a powerful man, finds such pain in the application of the probe that he always cries out, and it is only after long persuasion that he consents to its further employment. It is surprising that there is less sensitiveness on the left side, where the vessels of the malleus are markedly injected, than on the right, where there is no injection at all.

Case 18.—Theresa H., æt. forty-four years, has suffered for three years in the left ear, for one year in the right ear, from continuous tinnitus of varying intensity. Last year the tinnitus was decidedly improved under a long course of catheterization and the use of bougies. Pleased with this relatively good result, she then suspended treatment. The tinnitus has now returned in

its original intensity. Both drum-membranes are opaque, and show atrophic patches. Chorda-tympani to be seen distinctly on the right side. High-pitched tuning-forks are heard from the forehead and right mastoid process only on the right side ; from the left mastoid process heard on both sides, but weaker on the right. Tuning-forks of low pitch are heard from the forehead on both sides, weaker on the left ; from either mastoid process they are heard in both ears, but always weaker in the ear of the opposite side. Watch : R, 7 *cm.* ; L, 1 *cm.* After use of the pressure-probe for the first time on Nov. 10, 1884, tinnitus abates but only for a few moments, returning before patient has had scarce time to state the fact. Watch : R, 13 *cm.* ; L, 1 *cm.* After use of Politzer's method, condition unchanged.

Nov. 13*th.*—Watch : R, 12 *cm.* ; L, 1 *cm.* After use of the pressure-probe, tinnitus temporarily less. The improvement lasts, however, longer on the right than on the left side. Watch : R, 15 *cm.* ; L, 2 *cm.* After air-douche through catheter, tinnitus and hearing for watch remain unchanged.

Nov. 18*th.*—Tinnitus not as violent as at last sitting. Watch : R, 4 *cm.* ; L, 1 *cm.* After use of the probe, tinnitus worse ; watch : R, 3 *cm.* ; L, 1 *cm.* After bougieing the Eustachian tubes (isthmus admits a bougie $\frac{1}{3}$ *mm.* in diameter), tinnitus better ; watch : R, 3 *cm.* ; L, *ad concham.*

Nov. 24*th.*—Very violent tinnitus. Hears to-day worse than usual. Watch : R, 4 *cm.*; L, 1 *cm.* After use of probes, tinnitus less. Watch : R, 4 *cm.*; L, 1 *cm.* After use of the catheter, no further improvement in the tinnitus. Watch : R, 5 *cm.*; L, 1 *cm.*

Nov. 27*th.*—Very violent tinnitus on both sides. Watch : R, 2 *cm.*; L, *ad concham.* After use of the pressure-probe, tinnitus and hearing-distance for the watch unchanged. After use of the catheter, tinnitus less. Hearing for the watch same as before. In this case the application of the pressure-probe was very well borne, so that even at the first sitting some ten pushes of the instrument were made without causing the patient any noteworthy pain. There was also only a very slight degree of congestion of the drum-membrane after the application.

Case 19.—George K., æt. forty, presented himself at the policlinic on Nov. 14, 1884, with the statement that he had been hard of hearing for two years. He has never had tinnitus. On examination is found on either side a drum-membrane retracted, opaque, thickened with a very much foreshortened manubrium

and sharply defined posterior fold. Naso-pharyngeal catarrh. Moderate stenosis of the isthmus tubæ (bougie $\frac{8}{5}$ *mm.* in diameter passes). From the forehead, tuning-forks of high pitch are heard better on the left; those for low notes, better on the right. From the mastoid processes all the tuning-forks are heard in the opposite ear. By aërial conduction, all the tuning-forks are heard equally well on both sides. Watch: R, 1 *cm.;* L, 8 *cm.* After use of the pressure-probe, watch: R, 1 *cm.;* L, 13 *cm.* The use of the probe caused considerable pain.

Nov. 18*th.*—Watch: R, 1 *cm.;* L, 8 *cm.* After use of the probe, watch: R, 1 *cm.;* L, 12 *cm.* The operation causes on the left side severe, on the right side trifling, pain.

Nov. 20*th.*—Watch: R, 1 *cm.;* L, 8 *cm.* After use of the pressure-probe, watch: R, 1 *cm.;* L, 8 *cm.* In the left ear there have been occasional attacks of pain since the sitting before the last, but objectively no cause can be discovered.

Nov. 24*th.*—In the first two days after the last application, patient had in the left ear again occasional sticking pain. At the end of the posterior fold is seen an ecchymosis, the size of a millet seed. Watch: R, 1 *cm.;* L, 8 *cm.* After use of the probe, watch: R, 2 *cm.;* L, 11 *cm.* The pain caused by the use of the instrument is to-day less on the left than on the right side, and on both sides insignificant.

Nov. 26*th.*—The ecchymosis in the left ear is disappearing; the pain in this ear has not returned. Watch: R, 4 *cm.;* L, 15 *cm.* After use of the probe, watch: R, 5 *cm.;* L, 15 *cm.*

Nov. 28*th.*—Ecchymosis has entirely disappeared. Watch: R, 6 *cm.;* L, 22 *cm.* After use of the pressure-probe, watch: R, 6 *cm.;* L (11 *cm.* a few minutes later), 16 *cm.* Patient was bougied each time before the application of the probe.

Case 20.—Charles K., æt. forty, has suffered for about four years from hardness of hearing, and for some two years from intermittent tinnitus with occasional attacks of severe headache. Patient is very nervous, which is shown among other things by the considerable variations in the blood-pressure which occur within very short intervals of time, without any provocation. (The determination of the blood-pressure was made at the temporal artery by means of von Basch's sphygmomanometer.) Both drum-membranes retracted and opaque, with marked projection of the short processes. The high-pitched tuning-forks are heard from the forehead and the mastoid processes only in the left ear.

Tuning-forks of low pitch are not heard from the forehead; from the mastoid processes they are perceived in the corresponding ear. Aërial conduction good on both sides. Isthmus of tubes of normal calibre. Watch: R, 43 *cm.*; L, *ad concham.* After use of the pressure-probe for the first time (Nov. 17, 1884), tinnitus and hearing distance for watch unchanged. After use of bougie on left side, tinnitus less on both sides. Watch: R, 68 *cm.*; L, *ad concham.*

Nov. 21st.—Head less involved though the tinnitus persists on left side. Yesterday the condition was still better. Watch: R, 70 *cm.*; L, *ad concham.* After use of the probe, head freer, left tinnitus less severe. Watch: R, 104 *cm.*; L, *ad concham.* After use of bougie on left side, no further improvement of the tinnitus. Watch: R, 144 *cm.*; L, *ad concham.*

Nov. 25th.—Tinnitus and dizziness now better and now worse, as was the case before the treatment. Watch: R, 52 *cm.*; L, *ad concham.* After use of the pressure-probe, tinnitus and dizziness temporarily better. Watch: R, 100 *cm.*; L, *ad concham.* After bougieing the left Eustachian tube, watch: R, 88 *cm.*; L, *ad concham.*

Nov. 28th.—Head freer. Tinnitus on left side only. Watch: R, 106 *cm.*; L, *ad concham.* After use of the probe, tinnitus on left side the same. Watch: R, 111 *cm.* (80 *cm.* twenty minutes later); L, *ad concham.* After bougieing the left tube, tinnitus remains the same.

With the histories here presented I shall take the liberty to make some general observations. As far as the pain caused by the procedure is concerned, it varies within very wide limits. Some describe it as almost intolerable, others say it scarcely merits mention. Although I am far from stating it as a rule, I would not neglect to mention the fact that powerful, well-nourished individuals often prove much more sensitive to the use of the pressure-probe than those of anæmic and weakly appearance. As special illustrations of this, I may refer to cases 14 and 17. The former was a sixty-six-year-old woman, much reduced by all kinds of physical and mental suffering, who was ordinarily very sensitive to the other therapeutic procedures employed, but who bore with ease the use of the pressure-probe; the latter was a robust man of twenty-six years, who declared the

operation painful in the highest degree, and finally refused to submit to it, though its favorable action on the ear affection could not be doubted. In other cases the repetition of the procedure seemed to cause a blunting of the sensibility.

I have tried cocaine for its anæsthetic effect on the drum-membrane in two cases (13 and 15) but without avail; the patients even asserted that the employment of the probe was more painful than without the use of the drug. Zaufal,[1] who has made numerous experiments with cocaine, states that he has obtained a diminution of sensibility in the drum-membrane and also the handle and short process of the malleus by the use of a two per cent. solution. Opposed to these three experiments with positive results are as many with negative results, and Zaufal holds the view that we can count on a prompt result only when it is possible to get rid of the inhibitory action of the epidermis. Moreover, the same author has noticed increased sensibility following the use of cocaine in one case (perforation with granulations) after an interval of eighteen minutes, in another (otitis media squamosa) after forty-five minutes.

The sensitiveness is most marked, indeed, almost intolerable, when the probe touches the handle of the malleus, through which part the malleus, and so the whole chain of bones, can be moved to the greatest extent, as is seen by the large excursions made by the drum-membrane. These statements of Lucae I can affirm in every respect. Of the considerable amount of movement conveyed to the chain of bones from the handle of the malleus, I have been able to satisfy myself experimentally. In the laboratory of experimental pathology of Prof. v. Busch, I have made the follow, ing experiment: In a fresh temporal bone, removed from the body of an adult, an opening was drilled into the superior vertical semicircular canal. A short metal tube provided with a thread, was screwed, air-tight, into the opening, and connected by a rubber tube with a mercury manometer fixed on a stand. The tube connecting the manometer with the metal piece was filled with water. On pressure of the sound upon the manubrium of the mal-

[1] *Prager med. Wochenschr.*, 1884, No. 47.

leus, the mercury rose much higher than on pressing upon the short process.

In the employment of the pressure-probe, the following phenomena are more or less observed: By pressure of the probe on the short process, a pale yellow spot appears at this point, an evidence of the anæmia caused mechanically. Some moments after completion of the operation, the vessels along the handle of the malleus fill rapidly, and the drum-membrane along its upper border, as a rule, appears hyperæmic, the processus brevis projecting forward as a pale yellow point. The whole drum-membrane, occasionally, as Lucae also states, assumes a rosy hue. How long the hyperæmia lasts, I am not able to say exactly. Ordinarily, it has disappeared in twenty-four to forty-eight hours, when the patient returns for a repetition of the procedure, and only rarely are traces of it then present. The accidents that are sometimes observed after use of the probe claim more attention. I refer to the ecchymoses of the membrane which sometimes result from manipulation with the probe. In those cases in which the further course of these hemorrhages could be followed, there was complete absorption within four days (Cases 7 and 19), although the pressure-probe had been used in the interval. Of no greater importance are the other accidents after use of the instrument, referred to in my notes. These were the trifling hemorrhages in the region of the short process in a drum-membrane, much congested and swollen along its upper border (Case 2); and a small pin-head granulation at the short process (Case 1). Serious accidents, such as inflammations with tedious suppuration, were never noticed after the use of the probe.

The inflammatory process which developed in Case 1, cannot be regarded as a result of the operation, as it showed itself not till ten days after the last sitting; and for five days after it, the patient had not noticed the slightest pain in the ear.

With regard to the therapeutic value of this method of treatment, it must be said that a permanent result was very rarely seen in those forms of disease which are included in

the group of "chronic catarrhs of the middle-ear." The most of these cases were under observation for a much longer time than here reported, and several are at present still under treatment.

The patient, for example, whose history is given circumstantially in Case 4, appears regularly every two or three days to submit to the use of the probe. In this case a favorable result is recognizable, in as much that the tinnitus has considerably diminished. The hearing for the watch has remained unchanged. It needs to be repeated here that Lucae himself has not recommended his new procedure for all diseases of the sound-conducting apparatus coming under the head of chronic middle-ear catarrhs.

A permanent result after treatment by means of the probe was noticed in those cases of acute inflammation of the tympanic cavity and membrane, in which the upper posterior segment of the membrane was congested and swollen, and where the process had not yet advanced to purulent disintegration of the tissue. Such an observation was made in Case 2, in which, under the exclusive use of the pressure-probe, the inflammatory signs disappeared in three days. The use of the probe was followed by a like result in Case 5, though the permanency of the result is in doubt, as the patient came for treatment but once. Other observations of the same kind were made twice or three times when I began to experiment with the method recommended by Lucae, but exact notes were not kept of the results. The action of the probe in these cases, however, may be explained as a sort of massage, as the infiltration, at least in a circumscribed spot, is dissipated in a mechanical way and absorption is so stimulated.

The use of the probe exercises on the headache a favorable influence which sometimes, as in Case 16, persists a long time. In the other cases, the benefit was, however, of short duration. In one case the headache, which had not previously troubled the patient, was excited by the application of the probe. It was situated in the right side of the head and lasted but a few minutes. Moreover, it did not

appear until the patient had already been treated twice in the same way. As the headache in this case, so in two others (Cases 3 and 9) vertigo appeared during the course of the treatment by means of the probe. In one this happened after the patient had been treated in the same way repeatedly without producing any such effect; indeed, she had never had an attack of vertigo. The accident happened on her way home after the operation; on the same evening, about one and a half hours later, she had a second attack. This unpleasant phenomenon has been noticed but once since then in the same patient after a long interval, though she has been under observation for a considerable time. The attacks have been generally pretty severe but of short duration. In the other patient (Case 9) an attack of vertigo followed each sitting, but the recovery was always rapid. These accidents cannot be ascribed to the use of more than the usual force in the operation, because the first patient felt no more than the ordinary amount of pain on the day when she was attacked by the vertigo, and, moreover, the latter did not come on immediately after the operation. In the second of the cases in question, the attacks of vertigo following so rapidly the use of the probe may be connected with a great degree of mobility of the chain of bones, especially of the foot of the stapes in the foramen ovale. In favor of this view, we might consider the wide excursions of the drum-membrane noticed in this same case.

In an otalgia resulting from a carious tooth, the use of the pressure-probe proved itself useful in diminishing the very severe pain. The improvement lasted some hours; as was to be expected, the pain returned in its original intensity. It disappeared for good only when the exciting cause was finally removed.

During the period of treatment with the probe, the hearing distance for the watch increased in Case 1 from 1 *cm.* on both sides to 10 *cm.* and 17 *cm.*, and in Case 19 from 1 *cm.* to 6 *cm.* on one side and on the other from 13 *cm.* to 22 *cm.* On the other hand, cases are not wanting in which the hearing distance was diminished. In Case 13 in which the watch with the right (the better) ear was heard at first at a distance

of 32 *cm.*, the hearing distance fell in the last few days to 20 *cm.*, and even 13 *cm.* In Case 11, in which, at the beginning of the treatment, the watch could always be heard by aërial conduction, later on at a distance of 12 *cm.*, and once at even 19 *cm.*, the hearing for the watch deteriorated under the steady use of the probe till heard only *ad concham*, and later the perception was entirely lost. On the left side, the hearing underwent only trifling variations. The most marked improvement in hearing was seen in Cases 17 and 20, in which the hearing distance at times rose to 30–50 *cm.* In Case 20, the subsequent use of bougie and catheter produced a further improvement of 40 *cm.* In Case 7, in which the disorder was evidently one affecting the sound-perceiving apparatus, after use of the probe, the hearing for the watch was increased in the right from nothing to *ad concham*, and in the left from *ad concham* to 2 *cm.* In Case 10, also, the watch was heard once for a few seconds at the ear after treatment, though previously it was perceived neither by aërial nor by bone-conduction.

In conclusion, I would add some words on the influence of the method under question upon the subjective and auditory sensations. As to the interval which intervenes before the effect is noticed, this may follow immediately the use of the probe, or may be delayed a greater or less time—sometimes for even twelve hours. In the first case, the effect is apt to be of surprisingly short duration, rarely lasting over a quarter of an hour. When, however, the effect is postponed some time, it generally lasts from several hours to one or two days. Both statements admit of exceptions. A complete and permanent cessation of subjective noises was noted in not a single case. In Case 4, the unpleasant sensations have remained, up to the present time, much less than before, and sometimes cease for hours together. But the patient yet remains, as already mentioned, under treatment as he will not risk, by suspending it, the return of the tormenting subjective noises. A temporary improvement of the subjective auditory symptoms occurred in cases in which the sound-perceiving apparatus was at fault, for example, in Case 7. The influence of the treatment of

one ear upon the other is shown in Case 11, in which the tinnitus of the ear not directly subjected to the probe was considerably diminished.

In general it can be stated that the effect of the pressure-probe treatment on the subjective symptoms is similar to that observed after the use of massage[1] in like cases. The two methods resemble each other in the transitory nature of the results obtained.

[1] *Wiener med. Presse*, 1883, Nos. 26–31.

THE RELATIONS OF THE CHORDA TYMPANI TO THE PERCEPTION OF TASTE IN THE ANTERIOR TWO THIRDS OF THE TONGUE.

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Translated by Isidore Furst, New York.

DR. ARTHUR HARTMANN having given me an opportunity of observing a case of accidental division of the chorda tympani followed by paralysis of taste of the same side, I took occasion to investigate anew the question "of the origin of the fibres of taste of the anterior two thirds of the tongue."

The case referred to was that of a lady, aged thirty-four years, who had suffered from left otorrhœa and defective hearing ever since she went to school; during the last seven years she has had pains in the affected ear, attacks of vertigo, uncontrollable vomiting, and headache of an obscure character. The cause of all these symptoms was found in a polypus growing out of the drum cavity, above and behind which were cholesteatomatous masses; after their removal the symptoms ceased, only a slight otorrhœa remaining. During the summer of 1884, the otalgia, vertiginous attacks, and vomiting recurred, and inspection again revealed a polypoid granulation at the former site behind and above which were masses of cholesteatoma. Removal of the polypus with the snare, and repeated cauterization with chromic acid having failed to master the symptoms completely, an attempt was made to destroy the last remnants of the polypus with the sharp spoon. During this procedure, the effect of which was so thorough that since that time not a trace of secretion has shown itself, the chorda tympani was divided. Immediately afterward the patient experienced on the left side of her tongue a sensation as if a

membrane were stretched over it, and at the first meal of which she partook after her return home she could not taste any of the victuals on the left side, which appeared to her as if it were burned while she could taste very well with the right side.

When I examined the patient, with a view to determine more accurately the limits of this paralysis of taste, about eight weeks after its onset, there was absolutely no perception for bitter, sweet, acid, and saline substances (sulphate of quinine, sugar, glacial acetic acid, and table salt were used for the test) on the left side from the tip of the tongue back to the place where the papillæ circumvallatæ commence. Nor did the same substances, when applied within the limits named to the lateral border of the tongue, produce an impression of taste at any point ; while in the posterior third of the tongue, and from the median line to the right, all the statements as to the taste of the substances were prompt and exact. On the application of thermic irritants, such as ice, cold, warm, and lukewarm water to the region devoid of the sense of taste, the statements were correct as regards the differences of temperature perceived ; but the patient was unable to decide whether the cold or heat emanated from a solid or a liquid substance. On applying a small pellet of ice she felt a more intense cold than from a drop of cold water, but was unable to say which of the two bodies was solid, and which was liquid. The localization of tactile perceptions, tested with the æsthesiometer shows no noticeable differences between the anterior part of the left half and the same part of the normal right half of the tongue.

The perception of pain within the region devoid of taste is unchanged.

Examination of the drumhead shows it to be on the whole free from defects, excepting a small destroyed segment anterior and inferior to the short process, as well as Shrapnell's membrane which is completely destroyed. The superior margin does not merge into the upper wall of the auditory canal, because the part which otherwise immediately adjoins the former and receives it is absent, so that there is a pretty large cavity between the remaining upper margin of the membrana tympani and the rest of the upper wall of the auditory canal and the roof of the tympanic cavity. Otherwise the drumhead, somewhat thickened and opacified, shows the perfectly intact manubrium mallei in the shape of a protuberance in its normal position, and the short process is clearly visible. Antero-superiorly from the latter, the rudiments of the

head of the malleus are visible and demonstrable with the probe. Parallel to the lower end of the manubrium a sharply outlined oval cicatrix can be seen, while another cicatrix with indistinct margins is present in the posterior lower segment.

Slightly below the boundary between the posterior upper and lower quadrants, close to the posterior wall of the auditory canal, is an opaque, reddened, and somewhat tumid spot (the place of perforation caused by the polypus, which after its radical removal has again closed).

Irritation with the induced and the galvanic currents, by means of an electrode applied to this spot, causes a pain located solely in the drum cavity, but not the slightest sensations of taste or feeling in the tongue.

Our case, therefore, teaches, with a force equivalent to an experiment on a living human subject, that a severance of all the paths of conduction of the chorda is followed by a complete abolition of taste in the anterior two thirds of the corresponding side of the tongue.

In basing on this fact the deduction that, consequently, the chorda tympani furnishes all the fibres of taste for the anterior two thirds of the tongue, I seem to differ with the writer who was the last to devote particular attention to the relation of the chorda tympani to the perception of taste in the tongue, viz., with O. Wolf.[1]

This author, on the strength of a case carefully observed by himself, in which he believes the chorda tympani had been severed while the posterior fold was being cut, and in consequence of which paralysis of taste in the anterior third of the tongue ensued, concluded that the chorda supplied fibres of taste only to the most anterior third of the tongue. This deduction would be incontestable, if it were equally certain that the chorda in this case had been completely divided. This fact is not proven, and therefore the assumption cannot be excluded that, in the case referred to, the division of the chorda was only partial. This surmise gains force by the fact that the chorda is not firmly bedded at the point where it is liable to be cut when the posterior fold is

[1] O. Wolf, Frankfort-on-the-Main: Zur Function der Chorda Tympani, *Zeitschr. f. Ohrenheilk.*, ix., pp. 152–158.

divided, and can easily escape from the knife which reaches it during this operation. In further support of this view I think I may plead the fact that restitution of taste soon occurred within the paralyzed region. This, if all the fibres of taste had been severed, could have taken place, if at all, only after a longer lapse of time; while in our case it failed to occur even after several months. I think myself justified, therefore, in amplifying the conclusion drawn by Wolf from his case, viz., that the chorda tympani supplies only the anterior third of the tongue with nerves of taste, to the effect that this supply extends over two thirds—*i. e.*, to the entire portion not innervated by the glosso-pharyngeus.

Should it be possible to bring this conclusion into harmony with the observations and experiments of preceding writers, then the question as to the source of the fibres of taste in the anterior two-thirds of the tongue, which von Vintschgau [1] recently declared to be altogether unsettled, would thus be solved in the simplest manner beyond any possibility of cavil.

Let us see, then, what are the relations of our conclusion to those drawn from former clinical observations and experiments. The first author who expressed an opinion relative to the association of the chorda tympani with the sense of taste, Bellingeri,[2] owing to a paralysis of the facial nerve observed in his own person, which was associated with loss of taste on the corresponding side, looked upon the chorda as the main nerve of taste, while he absolutely denied this quality to the glosso-pharyngeus. In this respect we need but state that both anatomical and physiological observations have indubitably proved the glosso-pharyngeus to be the nerve of taste to the posterior third of the tongue, and with this limitation the conclusion is identical with our own.

In favor of our view we can also cite Cl. Bernard,[3] who,

[1] M. von Vintschgau, in *Handbuch der Physiologie* von L. Hermann, Bd. iii., p. 177.

[2] Caroli Fr. Bellingeri: Inaug. Dissert. quam publiæ defendebat in regio Athenæo, Anno 1818, die ix., maji Augustæ Taurinorum.

[3] Cl. Bernard: "Quelques observations relatives à l'action de la chorde du tympan." *Annales médico-physiol.*, 1843, ix., série i., ii. Cl. Bernard: "De l'altération du goût dans la paralyse du nerf facial." *Arch. générales de médecine*, vi., 4, p. 480. Paris, 1844. Cited from *Schmidt's Jahrb.*, xlvii., pp. 281–283.

after comprehensive experiments and clinical observations, arrived at this result: that an influence of the chorda on the sense of taste in the anterior two thirds of the tongue cannot be denied. But we cannot interpret the mode of this influence in the way he did, viz., as consisting in a motor participation of the chorda in the processes of tasting.

We find an additional advocate of our view in Duchenne,[1] who, chiefly on the strength of galvanic examinations, came to the conclusion that the chorda tympani is a nerve serving general sensory and gustatory purposes, and owing to this quality, influences the senses of taste and touch in the anterior two thirds of the tongue.

Our view receives a further clinical confirmation by a communication made in the same year by Cohn[2] of two cases in which the facial nerve was destroyed by tubercular caries of the petrous bone, and in which complete paralysis of the sense of taste was demonstrated in the corresponding half of the tongue. Since all the other nerves of the tongue were intact, the author concluded from this fact that the chorda tympani contributes largely to the perception of gustatory impressions, although the manner in which this took place could not be understood at the time. This point will be disposed of later on.

Stich's[3] observations on a number of paralyses of the facial nerve, in which he examined the influence of the paralysis on the sense of taste, led him to a similar deduction. He is of opinion that the nerves of taste of the anterior portions of the tongue run partially in the course of the chorda tympani to the facial nerve.

Giuberto Scotto,[4] too, on investigating the influence of a fracture of the petrous bone on the chorda tympani which

[1] Duchenne de Boulogne: "Recherches électrophysiol. et pathol. sur les proprietés et les usages de la chorde du tympan." *Arch. génér. de méd.*, xxiv., p. 385.

[2] Dr. Cohn: "Ueber Gehirn- und Rückenmarkskrankheiten, etc.—*Günsb. med. Zeitschr.*, v., 3, 4, and 5, 1854. Cited from Schmidt's *Jahrb.*, lxxxvi., p. 323.

[3] Stich: "Beiträge zur Kenntniss der Chorda tympani."—*Annalen des Charité-Krankenhauses zu Berlin*, 1857, Jahrgang viii., Heft 1.

[4] Giuberto Scotto: "Dermatitis oculi after fracture of the petrous bone."—*Gazz. Lomb.*, No. 35, 1858.

had been involved in the destructive process, found that the patient in question had lost the sense of taste on the same side. This fact he ascribed to the interrupted conduction of the chorda.

Equally corroborative is Voltolini's[1] observation of a patient whose chorda tympani was destroyed by long-continued otorrhœa, and who became affected with paralysis of taste of the same side of the tongue.

We find, furthermore, pleading in favor of our view, on the strength of clinical observations as well as experimental investigations, Inzani and Lussana,[2] when they assert that two nerves serve the sensation of taste: the glosso-pharyngeus, at the root of the tongue and in the pharynx; the chorda at the anterior half of the tongue. If these two authors look upon the chorda, not as a branch of the facial nerve, but as an independent nerve derived from the portio intermedia Wrisbergii, this will only serve to confirm a further assertion which I shall bring forward in the second part of this paper.

An observation entirely homologous to my own was made by Lussana,[3] in the same year, on a patient whose chorda tympani had been divided by a quack, and who, in consequence, had lost the sense of taste in the anterior two thirds of the corresponding side of the tongue, while the sensibility to touch and pain had remained intact.

Two years later, Neumann[4] came to the conclusion, by electrical examinations, that the chorda served the function of taste at the tip and the margins of the tongue; that it did not join the facial nerve centrally, but united with the peripheral domain of the trigeminus, and crossed with the latter to the brain.

In a different way—by division of the lingual and the

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[1] *Virchow's Arch. f. pathol. Anatomie und Physiologie*, xviii., 1860.

[2] "Sui nervi del gusto," Giovanni Inzani e Filippo Lussana di Parma. *Annal. universali di Medicina*, clxxi., p. 282, Agosto, 1862. Cited from *Schmidt's Jahrb.*, cxxiii., p. 182.

[3] Lussana: *Annali universali di Medicina*, clxxii., p. 307, Nov., 1862. Cited from *Schmidt's Jahrb.*, cxxiii., p. 183.

[4] Neumann: "Die Electricität als Mittel zur Untersuchung des Geschmackssinnes im gesunden und kranken Zustande, und die Geschmacksfunction der Chorda Tympani." *Königsberger med. Jahrb.*, iv., 1, p. 1, 1864. Cited from *Schmidt s Jahrb.*, cxxv., p. 164.

glosso-pharyngeal nerves, and subsequent histological examination of the peripheral ends of these nerves for degenerated nerve-fibres — Freyfeld-Skabadföldy[1] became convinced that the lingual nerve, after being joined by the chorda tympani, and, it seems to him, also by some fibres of the glosso-pharyngeus, supplies the tip of the tongue, and the greater part of its dorsum, with fibres of taste.

Of two years' later date is a communication by Brunner,[2] referring to a case in which a fall on the left temporal region was followed by impairment of taste at the left border of the anterior half of the tongue, ascribed, by the author, to rupture of the chorda tympani.

In the most recent paper on this subject, by Lussana,[3] we find reported two cases of total paralysis of the trigeminus, which ran their course without any disturbance in the perception of taste; and three cases of paralysis of the facial nerve, which were followed by total loss of taste on the corresponding side of the tongue, while the tactile sensibility remained unimpaired. Lussana looks upon them as a confirmation of his former observations and experiments, according to which, the anterior nerves of taste originate near the nucleus of the glosso-pharyngeus, then pass the intermediate nerve of Wrisberg, enter together the pars petrosa of the petrous bone, take part in the formation of the ganglion geniculi, leave the facial nerve in the chorda, and enter the lingual branch of the trigeminus. According to this author, there is only one gustatory centre in the posterior column of the spinal cord, and its emergent nerves lie partly in the path of the glosso-pharyngeus for the posterior gustatory segment, partly in the path of the facial, and mainly in the chorda tympani, for the anterior gustatory segment.

In papers published about the same time, in the years

[1] Dr. Michael Freyfeld-Skabadföldy: *Virchow's Arch.*, xxxviii., 2, pp. 117–186, 1867. Cited from *Schmidt's Jahrb.*, cxxxiv., p. 285.

[2] N. Brunner, Zurich: "Sturz auf die linke Schläfebeingegend, temporäre Agraphie und Aphasie und Lähmung der Chorda."

[3] Lussana: "Sui nervi del gusto. Novelle osservazione et esperienze." *Gazz. med. italiana Provinzie Venete*, Anno xiii., Nos. 42, 44–46, 1870. Cited from *Virchow-Hirsch's Jahresber.*, 1872, Bd. i., p. 161.

1872[1] and 1873,[2] Prévost, who found degenerated nerve fibres in the terminal branches of the lingual nerve, after division of the chorda in the drum cavity, positively demonstrated the presence of gustatory fibres in the chorda.

The same author observed in all animals experimented on, after division of both chordæ in the drum cavity, more or less destruction of the sense of taste, which was complete in the case of a cat, if the glosso-pharyngei were severed at the same time.

Very significant of the near relations of the chorda to the sense of taste are also the observations of Blau,[3] who witnessed the occurrence of gustatory and tactile sensations from irritation of an exposed portion of the chorda by irrigation of the ear or touch with the probe.

Although the experimental and clinical results here cited in favor of the gustatory function of the chorda are numerous, my compilation would not be complete if I did not at least point out the labors indirectly confirmatory of my view by Neumann,[4] Moos,[5] Erb,[6] and Urbanschitsch.[7]

Still, from the moment that gustatory function was first claimed for the chorda, there was no lack of decided opponents of this view.

As the first of these is to be named Alcock,[8] who bases his opposed view on personal experiments.

He believed, having demonstrated abolition of taste after division of the rami palatini, the lingual, and the glosso-pharyngeal nerves, that these nerves represented the per-

[1] J. L. Prévost: "Sur la distribution de la corde du tympan." *Compt. rend.*, lxxv., p. 1828, Juillet–Décembre, 1872.

[2] J. L. Prévost: "Nouvelles expériences relatives aux fonctions gustatifs du nerv lingual." *Arch. de physiol. norm. et pathol.*, v., pp. 253–375. Paris, 1873.

[3] L. Blau: "Ein Beitrag zur Lehre von der Function der Chorda Tympani." *Berliner klin. Wochenschrift*, 1879, No. 45.

[4] Neumann: "Partieller Verlust des Geschmackssinnes als Folge einer Otitis interna, ein neuer Beitrag zur Kenntniss der Chorda Tympani." *Königsberger med. Jahrb.*, iv., p. 340.

[5] Moos: "Innervationsstörungen durch Application des künstlichen Trommelfelles." *Centralbl. f. d. med. Wissensch.*, 1867, No. 46.

[6] W. Erb: "Ueber rheumatische Facialislähmung." *Deutsch. Arch. f. klin. Med.*, xv., 6, 1875.

[7] V. Urbantschitsch: "Beobachtungen über Anomalien des Geschmackes in Folge von Erkrankungen der Paukenhöhle." Stuttgart, 1876.

[8] Alcock: "Determination of the Question which are the Nerves of Taste." *Dublin Journ. of Med. and Chemical Science.* Lect. 1836. Cited from v. Vintschgau, "Handb. d. Phys.," v. Hermann, Bd., iii., p. 167.

cipient media of the sense of taste, and that the chorda tympani has no influence upon it.

Against this view, however, Inzani and Lussana, *l. c.*, demonstrated that division of the lingual nerve above the apposition of the chorda has no influence on the perception of taste; but, when performed at some point below the junction of the chorda, taste is abolished in the anterior portion of the tongue.

Furthermore, Biffi and Morganti[1] asserted that the ramus lingualis is the nerve of taste for the anterior third of the tongue, and specially emphasized that division of the chorda made no difference in the perception of taste between the healthy and the mutilated side.

The positive part of this assertion regarding the lingualis is negatived by Inzani's and Lussana's divisions of the isolated lingual nerve which had no effect on the taste; the other part, in reference to the chorda, is refuted by the results obtained by the same authors with the division of the chorda in conjunction with the lingualis, and by Prévost's experiments. In the latter, division of the chorda was always followed by more or less complete abolition of taste.

By experimental divisions Schiff[2] ascertained for the gustatory fibres in the anterior part of the tongue paths which differ greatly from those claimed by me. He asserts that all gustatory fibres destined for the anterior part of the tongue leave the medulla oblongata with the roots of the trigeminus and pass the ganglion spheno-palatinum. From here most of the fibres are said, in some other way, and very few after a circuitous passage, to reach the chorda tympani; and with the latter the facial nerve. According to him, division of the chorda produces only a slight impairment of taste in the anterior portions of the tongue.

The untenability of Schiff's view as to the slight influence of the chorda on the taste has been demonstrated by Lussana (*l. c.*) in the complete abolition of taste in the anterior

[1] Biffi e Morganti: *Omodei Annali universali*, cxix., p. 389. Cited from v. Vintschgau, *l. c.*

[2] M. Schiff: "Neuere Untersuchungen über die Geschmacksnerven des vorderen Theiles der Zunge." Moleschott's Untersuchungen, pp. 406–422. Cited in *Centralbl. f. med. Wissensch.*, 1867.

region of the tongue both in man and in the dog, after division of the chorda; while it was left to Prévost [1] to prove by experiment that an extirpation of the ganglion spheno-palatinum is never followed by any alteration of taste on the same side.

Nor is my conclusion invalidated by the paper of Vulpian,[2] who, after avulsion of the root of the facial nerve, failed to find any degenerated fibres in the tongue and in the chorda, and concluded therefrom that the chorda supplies no fibres to the tongue and therefore cannot be a gustatory nerve. For, as had been surmised by Inzani and Lussana, and anatomically demonstrated in 1873 by Sapolini,[3] the chorda or its continuation toward the centre, has nothing in common with the facial nerve, or with the acoustic nerve, which accompanies it for some distance, but the same path for a part of its course. Wherever it runs in the neighborhood of these two nerves it is surrounded by a separate sheath and can be independently isolated, and in accordance therewith it has an origin differing from that of the facial as well as of the acoustic nerve, viz., in the lateral columns of the cord. In view of these anatomical relations, certainly no one is justified in expecting a degenerating influence on the chorda from an avulsion of the root of the facial nerve.

Of the advocates of an opposite opinion, only one remains to be refuted: Carl,[4] according to whom the gustatory fibres for the anterior portion of the tongue are derived from the glosso-pharyngeus, pass through the ganglion petrosum and the tympanic nerve to the tympanic plexus, whence a portion (the major part) passes through the nervus petrosus superior minor to the otic ganglion and thus to the lingual nerve, and the smaller portion through the ramus communi-

[1] S. J. Prévost: "Recherches anatomiques et physiologiques sur le ganglion sphéno-palatin." *Arch. de phys. normale et pathol.*, i., pp. 87 and 207. Paris, 1868.

[2] Vulpian: "Expériences ayant par but de determiner la veritable origine de la corde du tympan." *Gaz méd. de Paris*, 1878, vii., 49e Année, 5e Série, p. 231.

[3] Giuseppe Sapolini: *Estratto dagli Annali universali di Medicina*, ccxxiii., Anno 1873.

[4] Carl August Carl: "Ein Beitrag zur Frage: Enthält die Chorda Tympani Geschmacksfasern?" *Arch. f. Ohrenheilk.*, x., pp. 152–178, 1875.

cans cum plexu tympanico to the ganglion geniculi; and thence through the facial and the chorda to the ramus lingualis.

This hypothesis, which, as I shall show below, is devoid of any anatomical basis, has from the start appeared to me as scarcely probable. If accepted, it would remain absolutely incomprehensible why the glosso-pharyngeus with its terminal branches destined for the posterior region of the tongue should, like all other sensory nerves, take the shortest route to the part to be supplied by it, while the fibres intended for the anterior part of the tongue are made to take first a circuitous course through all the nerve paths lying any where near it, and then only to reach the supposed region of its distribution.

This view, however, is based furthermore on the supposed anastomoses between the glosso-pharyngeus and the chorda, which are said to be situated in the ganglion geniculatum of the facial. But Sapolini[1] subsequently demonstrated that the chorda anastomoses in the ganglion geniculatum neither with the facial nor with any other nerve, and for this reason any derivation of the gustatory fibres of the chorda from the glosso-pharyngeus is inconceivable. Moreover, as regards Carl's statement in reference to the number of gustatory fibres passing in the chorda (he claims only the smallest portion) destined for the anterior region of the tongue, there is opposed the fact that after injury or division of the chorda great impairment of taste results, and has been repeatedly observed before his time, and subsequently again by Wolf and by myself.

Therefore, even an historical critical review of all the results obtained in the endeavor to solve the question of the gustatory nerves in the anterior portion of the tongue, furnishes us no fact and no defensible argument against my view that the chorda contains all the fibres of taste in the anterior two thirds of the tongue. On the contrary, my view receives confirmation from a great many sources.

Nevertheless, this gives us no answer to the question as

[1] Giuseppe Sapolini: "Un tredicesimo nervo craniale." Milan, 1881, p. 19.

to the origin of these fibres—a question which is identical with that as to the anatomical position of the chorda; it remains to ascertain whence the latter obtains its gustatory fibres and what is its origin.

Of the widely divergent opinions of authorities on this point, that of Bellingeri (*l. c.*) should be mentioned first; he considered the chorda a branch of the facial nerve, and so did Cl. Bernard.

The first writer who looked upon this branch as a continuation of the portio intermedia Wrisbergii was Cusco,[1] whose view was accepted by Duchenne (*l. c.*) and Lussana.

According to Stich (*l. c.*) the chorda is a branch from the trigeminus which, after uniting with the facial, runs peripherally with the latter and, anterior to the stylo-mastoid foramen, merges into the path of the fifth nerve.

In opposition to this view, Wachsmuth,[2] who observed no alteration of taste in twenty cases of facial diplegia, maintained that the chorda, as a mediator of taste in the anterior parts of the tongue, had nothing to do with the facial nerve, but owes its sensory quality to sympathetic fibres.

Neumann (*l. c.*), however, denied that the chorda accompanied the facial in its course toward the brain, but claims that in front of the stylo-mastoid foramen it unites with the peripheral domain of the trigeminus, in whose paths it passes toward the centre.

Lussana,[3] finally, in his last-mentioned paper, makes a detailed statement to the effect that the chorda is in uninterrupted communication with the portio intermedia Wrisbergii, and through the latter with a gustatory centre situated in the posterior column of the cord, from which the glosso-pharyngeal nerve is said also to take its origin.

Since division of the trigeminus or the facial at their points of origin in the cranial cavity (which has been re-

[1] Cusco: Thèse pour le doctorat en médecine, Paris, 1848. Cited from v. Vintschgau, *l. c.*

[2] Prof. Wachsmuth: "Ueber progressive Bulbärparalyse und Diplegia facialis," Dorpat, 1864. Reference in *Schmidt's Jahrb.*, cxxvii., pp. 131, 132.

[3] Lussana: "Sui nervi del gusto." Cited from *Virchow-Hirsch's Jahrb.*, 1872, i., p. 161.

peatedly done) is followed neither by loss of function nor degeneration of the fibres of the chorda, it must be regarded as settled that the chorda springs from neither of these nerves, and nothing remains to be discussed but the view advocated by Cusco, Duchenne, and Lussana, according to whom the chorda is said to be the peripheral end of a cranial nerve not hitherto recognized as such. To be sure, this view lacked heretofore every anatomical basis, and the credit of having secured it belongs to G. Sapolini. This author, after years of laborious investigation, the method and course of which have been fully described in the last-cited paper, published in 1881, succeeded in tracing this nerve, of which both the intermediate nerve of Wrisberg and the chorda tympani represent merely peripheral ends, from its origin in the lateral strands of the fourth ventricle through the ganglion geniculatum as far as the most minute ramifications of the chorda in the tongue.

This demonstration of an existing, quite independent nerve-path, of which the chorda tympani is merely the peripheral end, alone makes it clear how the latter can supply the tongue with gustatory fibres. But in view of this novel anatomical fact, we can no longer speak of a function of the chorda. We are forced, therefore, to assign the duty of supplying gustatory fibres to the anterior two thirds of the tongue, which above was ascribed to the chorda, to the nerve trunk which Sapolini calls the thirteenth cranial nerve; while the glosso-pharyngeus innervates only the posterior region of the tongue with fibres of taste.

MEMBRANOUS OCCLUSION OF THE EXTERNAL AUDITORY CANAL.

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Translated by ISIDOR FURST, New York.

The patient, now twenty-one years old, was affected, from infancy till she was fifteen, with a purulent discharge from the right, and probably also from the left, ear. Then the otorrhœa ceased spontaneously, and the hearing was not notably reduced, according to the patient's statement. Some time afterwards (she was unable to be more definite) considerable hardness of hearing ensued, and for about a year there has been tinnitus. She denied that she had ever had pain in the right ear.

She hears Politzer's acoumeter on both sides at a distance of 30 *cm.*; the bone-conduction for the tuning-fork is preserved on both sides.

In the depth of the right auditory canal can be seen a membrane, in position corresponding with the membrana tympani, but remarkably flat, and otherwise appearing like a drumhead in a state of great tendinous thickening, for which I mistook it at first. The fact that nothing could be seen of the ordinary details did not absolutely contradict this view. The air-douche producing no improvement in the hearing, an extensive incision was made in the pseudo-drumhead, and then, after the margins of the wound had separated, a few millimetres behind it appeared a second membrane—the true drumhead. Several radial incisions were thereupon made into the diaphragm, and cotton tampons inserted into the opening. By this means the membrane was caused to disappear in a short time, nothing remaining but a narrow border, scarcely half a millimetre broad. Thus far, now three months, no tendency to recurrence has been observed.

The hearing, which had improved considerably immediately after the paracentesis, is now, for the watch, $\frac{30}{200}$; the tinnitus has ceased. The drumhead, which is much thickened, shows two perforations, and from its lower border a cicatricial streak with tendinous lustre extends to the lower point of attachment of the destroyed membrane. The vertical distance of the membrane from the drumhead measures about three millimetres.

Ours is probably one of the rare cases of membranous occlusion of the external auditory canal occurring in the course of simple chronic otitis media, with secondary implication of the external meatus. For I think I must exclude the more profound destructive processes in the drum cavity and in the external auditory canal, because the patient positively denies ever having had pain in the right ear.

The mechanism of the process is obscure. Possibly there was at first great swelling of the integuments of the walls of the canal until the opposite walls came in contact, and the ensuing adhesion was stretched into a membrane by the gradual subsidence of the swelling.

DIPLACUSIS.—STATE OF THE BONE-CONDUCTION.

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FALSE hearing seems to occur frequently in the course of acute inflammation of the middle ear, yet it is but rarely demonstrated, because its exact determination requires some knowledge of music on the part of the patient, At least among my musical patients I have found, with relative frequency, some difference in the affected ear as regards the perception of tuning-fork tones in air-conduction. Most text-books indorse this view and state that this occurrence is not uncommon.

But in Hartmann and in Urbantschitsch alone do I find a brief remark as to the state of the bone-conduction in cases of diplacusis binauralis, and I therefore beg to report a case in point which is of interest with reference to the bone-conduction, and which occurred in a professional musician.

A musical director, a short time after a trying march under a burning sun, was affected with intense vertigo—he fell to the ground—and vomiting. At first there were no aural disturbances; soon, however, while some vertigo continued, slight tinnitus ensued. It was two weeks later that the patient observed more serious auditory disturbances which annoyed him most when playing the organ, because he *perceived the bass notes only confusedly.*

The watch was heard, right, $\frac{2}{200}$; left, $\frac{25}{200}$; whispered speech right, at 15 *cm.*; left, at $5\frac{1}{2}$ metres.

The tuning-fork (medium size English instrument with clamps which can be placed to give tones from A to C) in *air-conduction* was heard correctly on the left, but on the right side, for all tones from A to F, almost a full tone higher. But if the vibrating tuning-fork was *firmly pressed into the right external auditory meatus* the patient heard the tone only very slightly higher than on the left, or normally, but still not quite correctly.

Catheterization of the tube made no difference in the acuteness of hearing or in the perception of the tuning-fork. Both drum-heads showed a moderate diffuse opacity and were drawn inward, the right more so than the left. There were no evidences of recent inflammation ; an exudation in the drum cavity could not be positively demonstrated.

I am inclined to ascribe the affection to a simultaneous inflammation, probably of a serous nature, of the middle and internal ear. In favor of inflammation of the middle ear we have the difference between bone- and air-conduction, perhaps also the deafness for bass notes mentioned above. On the other hand, the intense vertigo and the vomiting are probably due to labyrinthine disease, and the diplacusis in bone-conduction, though it was but slight, is certainly of that origin. In accordance with this view, the treatment comprised catheterization, firm closure of the right ear, potassium iodide internally, and the constant current (positive pole to the right mastoid process), and a cure was effected within a few weeks.

OBSERVATIONS ON THE WATCH AS AN ACOUMETER AND THE UNIFORM NOTATION FOR HEARING-TESTS, PROPOSED BY H. KNAPP.

By F. BEZOLD, Munich.

Translated by Dr. J. B. McMahon, New York.

At the meeting of the American Otological Society held on July 14, 1885, Dr. Knapp expressed regret that in my examinations of schools, I had failed to measure the hearing distance for the watch in the majority of the schools. He also called attention to the method of stating the hearing distance introduced by him and Dr. Prout, *i. e.*, by means of a fraction analogous to the form universally adapted in ophthalmology for expressing the acuity of vision, and argued the desirability of its general adoption.

As for my former omission I consider the reason which gradually induced me in the course of my investigations to abandon entirely the use of the watch of sufficient practical importance to warrant a presentation of them from some points of view.

The number (222) of ears tested by me [1] with the watch, Politzer's acoumeter, and whispered speech, was sufficient to warrant a judgment as to the comparative value of these three methods; in examinations of large series of cases Von Tröltsch has already given a number of reliable reasons why watches prove unsuitable as acoumeters. It is only in the course of these investigations, however, that I have been positively convinced that even a single individual watch is

[1] These Archives, vol. xiv., pp. 158, 242.

the most unreliable of all the instruments used in testing hearing.

Let any one compare the descending curve (in Plate I.) which was obtained in testing the 222 cases for whispered speech, with that which showed the results for whispered speech in the total 3,836 cases, and the similarity of the two in form is very evident.

Further, the curve found with Politzer's acoumeter differs but little from these two, though it has not so definite a form. The hearing-curve obtained with the watch in the same series of children submitted to examination appears quite different. With the employment of the other tests, the number of those possessed of excellent hearing is marked by a very considerable ascent at the beginning of the curve, and following this we have a descent in a form approximating the parabola; on the other hand, with the watch the results are strikingly different, the curve showing two maximum points separated by fully two metres, all indications of the parabola-form being absent.

These varied results already speak against the reliability of the watch. Of its small value as a test of hearing, I have, however, been much more firmly convinced in the examination of individual cases. The tests in the schools were all conducted with the eyes covered. Whilst the results with the whispered speech and, in a less degree, with Politzer's acoumeter were, on the whole, decided and consistent, the statements of at least a part of the pupils were vacillating and uncertain when the watch was employed.

Notwithstanding all possible precautions, complete quiet, the removal of all other watches and the covering of the eyes, there was, with some of the pupils, not only a variation of metres even in the results, but a few persisted in stating that they heard the watch when, as a control experiment, I held it in my closed hand at several metres' distance, and became at last indignant when I doubted their assertions. These contradictory results in using the watch, as compared with the two other tests, may be simply explained, I think, as follows: The ticking of the watch be-

longs to the class of sounds which most persistently strike our ears, and which we are accustomed and, in the performance of mental work, are compelled to disregard. As those who live near the waterfall do not notice its roar, as the miller no longer hears his wheel, even so is it with our ears and the watch. It is therefore probable the uncertainty of tests made with the watch rests, at least, partly on psychial grounds and partly is connected with real after-sensations, such as have been accurately studied by Urbantschitsch.

A second more general consideration has also induced me to confine myself to the employment of whispered speech. According to P. Wolf the tones contained in speech extend over the lower eight octaves. The watch gives two tones separated by a small interval, and Politzer's acoumeter a single tone. Further, the tones of both these instruments are impure. If now we make use of speech, our test includes the greater part of the scale which is formed of the lower eight octaves and, moreover, sounds of the most varied character. Why, then, should the two tones of the watch, which still lie within the limits of this scale, be used as a separate test? Should we desire generally to examine the hearing for individual tones in addition to speech, these tones should, for exact work, be at least pure, and the examination ought to extend over the entire scale. It is only thus that we can discover all the chance defects of individual ears, which defects probably account, in some cases, for the difference in the hearing for the watch and for speech. That such an examination, on account of the length of time required, must remain merely a *pium desiderium* needs no proof. I would like to have been able to have made investigations in the upper octaves above the limits of speech, but the age of the patients examined and the limited time at my disposal placed this beyond my power.

As for Knapp's proposal to adopt a uniform method of notation for the hearing distance, such a project is one of general interest, and the steps made by Knapp and Prout in this direction deserve grateful recognition. It is necessary, in this relation, however, to keep in mind a few inaccu-

racies dependent even more on the present state of otology than on the proposed methods of notation. When in ophthalmology the acuteness of vision is expressed by the relation of the found fraction to the normal acuteness ($= \frac{20}{XX}$), we have in this expression a sharply defined statement of the result. For here we deal with known magnitudes. In the first place the acuteness of vision of a normal eye is given ($V = \frac{20}{XX}$), a fact established by a great number of extended series of observations. The denominator of the fraction is fixed as marking the distance at which fully comparable objects are seen at a visual angle of five minutes. It remains now only to determine by measurement the numerator of the fraction. The smaller this is found to be, the greater is the angle of distinct vision for the examined eye, or, in other words, so much the less its acuteness of vision.

The conditions are much less simple in testing the hearing. First, with regard to the determination of the normal acuteness of hearing, Knapp's proposal goes to show how far we are removed from unanimity. Wolf, Chimani, Hartmann, and others have found twenty to twenty-five metres the normal hearing distance for our by far most reliable test, *i. e.*, whispered speech. These results my investigations also go to confirm, as the greater part of the children examined understood whispered numbers of one or two places at a distance of twenty metres, and some of these at least would have heard still further if there had been room to make the trial. Nevertheless, Knapp fixes the normal hearing distance for his whispered speech at twenty feet. This very decided difference is probably to be explained by the fact that Knapp has not so completely excluded external disturbing sounds and, further, that he requires unexpected words to be used in making the test. I do not consider this last idea judicious; for the more unexpected are the words employed, the greater advantage will the intelligent have over the undeveloped and mentally deficient in recognizing them. The errors so arising become so much the less as the chosen series of words becomes more equally accessible to the mental abilities of the entire number of individuals

tested. For these reasons and others, presented more fully in my report on the examinations of schools, I have decided to reject sentences and to employ in testing only single words and these representing numbers of one or two places. The choosing of the simplest words in testing the hearing is of a kind with the selection of test-type by Snellen. He has with perfect propriety excluded from his tests all characters that are unusual or difficult to decipher, and confines himself to proportionately few and simple ones.

With regard to the second quantity appearing in the expression, *i. e.*, the denominator of the fraction which is to express the degree of deficiency, otology is at a much greater disadvantage than ophthalmology. Knapp himself in his first article drew attention to this. In the visual tests we have to deal with a few objects which can be compared with each other, and which all subtend a visual angle of five minutes. Although in examinations of the hearing we obtain almost absolute quiet in the neighborhood (the sounds of every-day life, whether more or less marked, may be likened to the varying intensity of illumination to which tests for vision are subject), yet even the objects used for trying the hearing, and especially the whispered speech, are by no means as constant quantities as are Snellen's letters in determining acuteness of vision. On the one hand, we do not possess so complete a control over the loudness of the whisper as to make it equal to the test-type, whilst, on the other, all three of the above-mentioned tests for hearing present much more complicated tasks than the visual tests. In the case of whispered speech, we know only that we are mainly confined to the lower eight octaves and produce a great variety of noises; the tones of the watch and acoumeter contain a series of not yet determined over-tones, probably lying near one another, which produce the effect of a noise. Our means of testing hearing differ, therefore, as Knapp himself has recognized, among themselves not only in their intensity, but also qualitatively.

In spite of all these unfavorable circumstances, most of which are inherent, I am far from opposing the suggestions of Dr. Knapp; I would desire rather by discussing them to

draw attention to the fact that we must content ourselves with adopting the system of notation as a very judicious and intelligible simplification, but that we must avoid impressing those not clearly connected with otology with the view that we have obtained a mathematically accurate means of expression.

As for the special figures adopted by Knapp, I cannot agree to twenty feet for the hearing distance for whispered voice, this being at variance with the results of the investigations of other authors also. As for the acuteness of vision, so also for the hearing distance, the results obtained from those not advanced in years should determine the standard.

The adoption of the expression $\frac{I}{\infty}$ for quantitative hearing for whispered and conversational speech, likewise borrowed from ophthalmology by Knapp, I consider very proper, and I have already employed it in my school examinations.

Finally, I think it desirable to make use in all these expressions of the generally understood metre- instead of the foot-system.

REPORT ON THE PROGRESS OF OTOLOGY DURING THE FIRST HALF OF 1885.

Translated by Dr. JEFFERSON BETTMAN, Assistant Surgeon to the New York Ophthalmic and Aural Institute.

I.—NORMAL AND PATHOLOGICAL ANATOMY AND HISTOLOGY OF THE EAR.

BY H. STEINBRÜGGE, OF GIESSEN.

1. Prof. Dr. VOLTOLINI, of Breslau. Some anatomical features and functions of the cochlea. *Virchow's Archiv*, Bd. C, Heft 1.

2. AUG. FOREL. A preliminary communication regarding the origin of the acoustic nerve. *Neurolog. Centralbl.*, No. 5, 1885. (Reviewed by A. Eulenburg, in the *Centralbl. f. klin. Medicin*, No. 23, 1885.)

3. H. STEINBRÜGGE. (From the pathological laboratory at Giessen.) A contribution to the corrosion anatomy of the ear. *Centralbl. f. d. med. Wissenschr.*, No. 31, 1885.

4. Prof. Dr. E. ZUCKERKANDL, of Graz. The Eustachian tubes of the tapir and rhinoceros. *Arch. f. Ohrenheilk.*, Bd. xxii., Heft iii., iv., p. 222.

1. VOLTOLINI describes the blood-vessels in the limbus spiralis of the cochlea. (In reviewing, we restrict ourselves to the anatomical portion of this publication.) On transverse section these are visible in the regio dentata, below the line of insertion of the membrana Reissneri and memb. Corti. These vessels ramify among the bundles of nerve fibres, and in the vicinity of the habenula perforata form a series of vascular loops; the latter communicate with the vas spirale int.

2. FOREL perforated the left temporal bone of a new-born rabbit, destroyed the acoustic nerve, and on examination of the har-

dened brain found complete atrophy of the posterior lateral and partial atrophy of the anterior roots of the acoustic. According to this, the acoustic nerve has but two distinct roots. The so-called medial portion of the posterior root is merely an appendix of the anterior. The anterior root can be traced partly in the cerebellum and in part in the anterior nucleus (Meynert, nucl. accessor., Schwalbe). Destruction of the acoustic produced no atrophic changes in either the inner nucleus (Meynert), the external nucleus (Deiters), the fibræ arciformes of the medulla oblongata, or of the posterior longitudinal bundles and the crura.

3. STEINBRÜGGE describes a mode of taking casts of the perilymphatic spaces of the labyrinth, including the membranous structures, by means of celloidin. This material has the advantage of not being acted upon by muriatic acid. After removing the labyrinth as early as possible from the temporal bone and carefully detaching the plate of the stapes from the oval window, the bone is immersed for forty-eight hours in a solution of equal parts of absolute alcohol and ether. It is then placed for a period of eight days in a dilute solution of celloidin. The vessel containing the latter is left uncovered, and through gradual evaporation the solution becomes thicker in consistency. The bone, surrounded by the thickened celloidin, is then placed for three days in fifty-per-cent. alcohol. The surplus celloidin is then scraped off the outer surface of the bone, and the latter is again placed in pure muriatic acid. After twenty-four hours the acid is renewed, and at the end of forty-eight hours the macerated bone is carefully removed, and the cast of the labyrinthian cavities is then preserved in equal parts of alcohol and water. Possibly in a slower process of maceration in a diluted solution of acid, the membranous structures of the labyrinth may be sufficiently preserved to enable their isolation after the celloidin cast has been dissolved in ether-alcohol. This method of taking celloidin casts is applicable to any empty cavity.

4. ZUCKERKANDL publishes his examination of the Eustachian tubes of a tapir and of a rhinoceros. The tubes of the tapir are characterized by the presence of a smooth, narrow-edged air-sac, the size of a hen's egg. This cavity is situated about 8 *mm.* behind the pharyngeal opening of the tube, extends upwards 45 *mm.*, connecting with the cartilaginous portion of the tube, and reaches, posteriorly, 22 *mm.* beyond the auditory organ. The comparatively small-sized portion of hyaline cartilage covers the

upper wall of the tube, and, projecting equally downward in a medial and lateral direction, forms a kind of groove (safety tube); the medial wall is strengthened by an addition of fibrous cartilage. The levator palati is pushed outward by the air-sac, and is situated between the tensor and the lumen of the tube. The mucous membrane lining the tube presents numerous ridges, notably on the floor of the tube, and is probably lined with the ciliated variety of cylindrical epithelium. Zuckerkandl found no acinous glands, but observed adenoid tissue in the shape of follicles. The resemblance existing between the air-sacs of the tapir and horse, establish beyond doubt a relationship between the genera equus and tapirus.

The cartilaginous tubes of the rhinoceros, a female, aged fourteen years, were 89 *mm.* in length. At the neighborhood of the petrous portion of the bone, the mucous membrane was pushed inward by a sort of vascular network, formed by some branches of the internal carotid and a continuation of the cavernous sinus. The hyaline cartilage presented the usual shepherd's crook appearance. The levator was also situated somewhat to one side. The appearance, on cross-section, varied; at the middle of the tube, the narrowest portion was observable. At the upper and lateral portion, the hyaline cartilage was strengthened by bundles of fibrous tissue containing some hyaline cartilage cells. The mucous membrane was lined with ciliated epithelia, contained acinous glands in its deeper layers, and adenoid tissue toward its surface.

II.—PATHOLOGY AND THERAPEUTICS OF THE EAR.

By A. HARTMANN and E. SCHULTE of Berlin.

1. Dr. Paul Schubert, of Nürnberg. Report of the first five years' practice of Otology. *Arch. f. Ohrenheilk.*, Bd. xxii., p. 51.

2. Dr. Henri Martin. Report of the ear clinic of the National Institute for Deaf-Mutes. Statistics of the year 1884. *Annales des mal. de l'oreille*, etc., tome xi., p. 16.

3. Dr. E. de Rossi. XIII. Anno di insegnamento della Otojatria. Anni statistico-clinici per l'anno scolastico 1883–1884. Roma, 1885.

4. Dr. Bezold, of Munich. Result of school examination regarding the power of hearing in the young. *Aertzl. Intelligenzbl.*, No. 15, 1885. These Archives, vol. xiv.

5. Dr. FRENCH BONHAM. On otology in relation to general medicine. *The Lancet*, Feb. 25, 1885.

6. W. B. DALBY. Affections of the throat and nasal passages associated with disease of the middle ear. *The Lancet*, Jan. 10, 1885.

7. Dr. POMEROY. Otological contributions, *New York Med. Jour.*, April 18, 1883.

8. Dr. J. A. ANDREWS. Malarial affections of the ear. *Med. Record*, March 7, 1885.

9. Prof. BUROW, of Kœnigsberg. Syphilitic infection by means of the Eustachian catheter. *Monattschr. f. Ohrenheilk.*, etc., No. 5, 1885.

10. Dr. E. MÉNIÈRE. The influence of the menopause upon aural diseases. *Annales des mal. de l'oreille*, etc., No. 2, 1885.

11. Dr. GELLÉ. Researches upon some subjective phenomena of hearing. *Progrès méd.*, No. 9, 1885.

12. Dr. BEZOLD, of Munich. An attempt at explanation of aërial and bone-conduction in Rinne's test, with notes of an autopsy. *Aerztl. Intelligenzbl.*, No. 24, 1885.

13. Prof. Dr. JOS. GRUBER. Examination of hearing. *Monattschr. f. Ohrenheilk.*, etc., No. 2, 1885.

14. Dr. POMEROY. Detection of unilateral deafness. *Med. Record*, March 21, 1885.

15. Dr. KAUFMANN, of Prague. Graphic demonstration of the respiratory movements of the membrana tympani. *Wiener Med. Presse*, p. 183, 1885.

16. Dr. W. KIESSELBACH, of Erlangen. Partial bulging of the tympanic membrane in uniform increased pressure. *Monattschr. f. Ohrenheilk.*, etc., No. 1, 1885.

17. Dr. C. KELLER, of Cologne. Rupture of both membranes and bilateral labyrinthine concussion. *Ibid.*, No. 6.

18. C. MIOT. Complications arising from forcible injections into the external ear. *Revue mens. de laryngol.*, etc, No. 4, 1885.

19. Dr. BOUCHERON. Auditory troubles due to the detonation of fire-arms. A contribution to the study of "otopiésis" (aura. compression) in adults. *Ibid.*, No. 5, 1885.

20. Aural compression in deaf-mutism. Same author. *Ibid.*, No. 2, 1885.

21. Dr. DELSTANCHE. An almost complete cure of a case of

bilateral traumatic deafness following the use of the rarefactor, *Annales des mal. de l'oreille*, etc., No. 2, 1885.

22. Dr. KIRCHNER, of Würzburg. The effect of cocaine in operations on the drum membrane. *Deutsche med. Wochenschr.*, No. 4, 1885.

23. Prof. E. ZAUFAL. An additional communication on the application of cocaine in nasal and aural therapeutics. *Prag. med. Wochenschr.*, No. 7, 1885.

24. J. BARATOUX and E. J. MOURE. Cocaine.

25. Dr. STANISLAUS VON STEIN. The use of cocaine in diseases of the throat, nose, and ear. *Deutsche med. Wochenschr.*, No. 9, 1885.

26. Dr. VICTOR LANGE, of Copenhagen. Remarks on the use of cocaine. *Ugeskrift fur Laeger.*, Nos. 14, 15, 1885.

27. J. WARD COUSINS. New aural inflator, evacuator, and injector. *The Lancet*, p. 1031, 1885.

28. F. SEMON. Electric illumination of the various cavities of the human body. Faradization, galvano-cauterization and electrolysis by means of pocket accumulators. *The Lancet*, pp. 471 and 512, 1885.

29. Capt. M. PLESSNER, of Rathenow. The antiphone, an instrument to render tones and noises inaudible.

1. SCHUBERT'S report treats of 2,000 patients who came under his observation during the period of five years. He reports a large number of interesting cases, including one of membranous closure of the external auditory meatus. He observed that ecchymoses in the membrane, following a blow upon the head, migrate in a radiary direction toward the periphery. Besides boracic acid, he advocates the use of acetate of alum in the treatment of purulent middle-ear inflammation. His report includes five cases of partial tone-deafness. In two cases all tones above c^4 were not heard. In another case the middle and lower tones were distinguished on both sides merely as noises. It was only from the notes beginning in the octave above the clef, that musical tones were appreciated as such. In the fourth case, g^3 was heard as $a,^3$ and higher tones were not perceived at all. In the fifth case, the coexistence of a sector-shaped hemianopsia arising simultaneously with the aural trouble, would locate the lesion in the cortex of the occipital and temporal lobes with a concomitant partial destruction of Munk's visual and auditory centres. His report includes

two cases of sinus-thrombosis, both terminating fatally. A case of objective tinnitus in a patient suffering from clonic spasm of the constrictor muscle, was also accompanied by spasmodic contractions of the soft palate. He tabulates seventeen cases of cerebro-spinal meningitis and forty-three ear cases of syphilitic origin. Schubert intentionally avoids any reference to the result of treatment in his statistics. He shares our views, previously expressed, that the result of the treatment as merely indicated in the terms "improved," "cured," can have no scientific values whatever. Schubert, however, goes to extremes in regarding the abuse of these expressions as an unjustifiable peculiarity of otologists.

2. MARTIN published a statistical report of the ear clinic of the National Institute for Deaf-Mutes at Paris, superintended by Dr. Ladreit de Lacharrière. The tenor of this report readily determines the standing of the clinic. In all, 2,152 cases are reported, of which, however, but 1,046 are really ear cases. Excluding errors of articulation, diseases of the pharynx and nose, of the hair and other organs, the report treats of fourteen classifications. Diseases of the external ear are represented by 158 cases, including 90 cases of simple catarrhal inflammation (Otite externe catarrhale simple), 31 cases of eczema, 24 cases of herpes vesicularis, etc. The general treatment in diseases of the external ear consisted, without any differentiation, in the use of medicated baths (sulphur or arsenic), anti-scorbutic syrup, and, in almost all the cases of saline cathartics, etc. Local treatment comprised the application of blisters back of the ear and injections of a decoction of poppy heads containing a small amount of borax. Neither Ladriet de Lacharrière nor his *chef de elinique*, Martin, have specified whether it was the antiscorbutic syrup combined with saline cathartics or the decoction of poppy heads which exerted a determining action in the treatment of these simple catarrhs of the external ear.

The diseases of the tympanic membrane include sclerosis, thickening, deformity, adhesions, relaxation, chalky deposits, etc., in all 149 cases. Rheumatism, herpes, eczema, neuralgia, etc., are mentioned as unusual causes of acute inflammation of the middle ear. The treatment is similar to that of the external ear; according to indications, the waters of Enghien, Challes, or Bourboule were used.

Besides the various classifications—chronic diseases of the tym-

panic cavity, diseases of the chain of ossicles, diseases of the petrous portion, inflammation of the labyrinth, a separate division is devoted to kophosis; typhus, measles, meningitis, rheumatism, etc., are given as causes of the latter. In a given number the kophosis was attributed to a previous otorrhœa, with destruction of the membrane and loss of the ossicles.

3. De Rossi reports statistically the cases treated at the ear clinic at Rome during the thirteenth semester, 1883–1884. Five hundred and sixty-five patients were treated, and the clinical history of cases presenting special interest is added. In addition, the report also treats of observations and clinical remarks on diseases of the naso-pharynx and larynx coming under observation during the two terms of instruction, 1882–1883, and 1883–1884.

S.

5. Bonham dwells upon the intimate relation frequently existing between diseases of the ear and the organism in general, and urges the necessity of a recognition of this on part of the general practitioner. The latter's knowledge should at least be sufficient to diagnose the aural trouble. According to Bonham, only those cases requiring dexterity in the manipulation of instruments, etc., should be sent to specialists. S.

6. Dalby calls attention to the frequent coexistence and dependence of middle-ear trouble upon nasal and pharyngeal affections. In connection with nasal catarrh, adenoid vegetations are the most frequent factors. He prefers the use of Loewenberg's forceps in the removal of the latter. In abscising hypertrophied tonsils he favors the use of Ewers' guillotine. S.

7. Pomeroy publishes the clinical history of three cases. The first was a case of papulo-tubercular affection of the tympanic membrane occurring in an individual suffering from hereditary syphilis; the second, a case of chondritis and perichondritis of the auricle, probably of neuro-paralytic origin; and the third case was one of displacusis binauralis. A chronic otitis media affected both ears. At first, a given note was perceived a tone higher in the right ear, but after seven treatments it was reduced to the same as the other ear. S. M. Burnett.

8. Andrews doubts the existence of a malarial otitis *per se*. In all the cases described as such, an otitis existed prior to the development of the malarial complication. S. M. Burnett.

9. Six cases of undoubted syphilitic affection, produced through the agency of an infected Eustachian catheter, induce Bu-

ROW to dwell upon the necessity of a previous examination of the fauces ere attempting catheterization. In case a syphilitic lesion be found, the patient should be provided with his own catheter.

S.

10. MÉNIÈRE describes the influence of the menopause upon diseases of thc ear. He distinguishes between previous existing diseases influenced by, and those diseases directly attributable to this period of life. He reports a large number of cases, illustrating both phases, and shows that the cessation of the menses exerts an unfavorable influence upon various forms of ear trouble.

11. GELLÉ has investigated some of the subjective auditory impressions. In conducting his observation, he used three tuning-forks, and paid special attention to the perception of the sound. His object was to add to the field of aural semeiology. He made use of a special contrivance, isolating the air between the vibrating body and the membrane acted upon, and, by means of various experiments, attempted to establish the relation between the effect of sound and sound itself. S.

12. BEZOLD points out that in studying the physical process in bone-conduction, it is necessary to form a continuous chain of solid conductors between the source of the sound and the labyrinthian fluid. In this manner, according to him, the conditions of the sound-conducting apparatus—namely, that of the varied tension of the ligaments,—can be tested experimentally outside of the skull.

The author's experiments, based upon this, show that tension of the conducting apparatus, and principally that of the ligament. annul., markedly promotes bone-conduction. He thinks this affords a simple explanation for the action of Rinne's and Weber's tests in the greater number of cases of middle-ear trouble. Increase of tension of the sound-conducting chain, at any part, correspondingly decreases the capacity for the conduction of aërial sound-waves, but favors the transmission through bone. This condition will account for the great variance in diseases of the middle ear and those of the nervous apparatus—a difference most strikingly illustrated by Rinne's test.

The post-mortem examination of a case which had come under his clinical notice sustains him in his views. S.

13. GRUBER supplements Rinne's test, by placing a finger of his disengaged hand loosely in the ear examined at the moment when the vibration of the tuning-fork, held closely to the ear, is

no longer perceived. As soon as the tuning-fork comes in contact with the finger closing the ear the sound is again perceived. The nearer the tuning-fork is brought to the ear, the stronger the sound.

According to Gruber, this is due to consonance and to simultaneous conduction of the sound by means of the walls of the auditory meatus. Unilateral deafness is more certainly determined by means of this test than any other method. This test is also of value in detecting the simulation of one-sided hardness of hearing.

14. When one ear possesses normal hearing power, the detection of the exact amount of hearing power in the other, when it is diminished or lost, becomes almost impossible, it being difficult to tell whether the tests on the affected side are heard by the diseased or the normal ear. Among other plans, POMEROY suggests, that while the test is being applied on the affected side, that ear be closed with the finger; if hearing is unaffected, then it is certain that the ear does not participate in audition; if it is made worse, it takes part. (This experiment is well known.)

S. M. BURNETT.

15. KAUFMANN published three cases in which the respiratory movements of the membrana tympani were plainly visible. The cases were observed in Prof. Zaufal's ear clinic, and experiments with Marey's instrument yielded a number of interesting tracings. In all three cases, the act of inspiration was accompanied by a negative excursion of the membrane, that of expiration by a positive movement. The tubes were pervious in all, and in none was the excursion of the membrane accompanied by a simultaneous movement of the velum palate.

16. According to KIESSELBACH, pressure made by means of Siegel's otoscope upon a very movable membrane and hammer, produces a state of affairs similar to that produced by partial pressure on a membrane stretched loosely over the opening of an air-tight vessel; while the portion pressed upon sinks in, the remainder of the membrane becomes prominent. This protrusion of the membrane is best seen in atrophic portions or cicatrices, these rising above the remainder of the membrane as little prominences.

17. The case recorded by KELLER is that of an engineer, aged twenty-five, who was hurled several feet and rendered unconscious for ten minutes, by the force of an explosion of gases while he was

examining a boiler. A few days later there was noticed a profuse discharge from the left ear, accompanied by considerable deafness and great dizziness. Both drum-membranes were the seat of rupture in the anterior half. The rupture was smaller in the ear, turned toward the sources of the explosion. The deafness, at first slight, gradually increased.

18. The clinical history of a lady suffering from a chronic inflammation of the left middle ear from whose right ear, with normal hearing power, a physician attempted to remove a small plug of cerumen by forcibly syringing with warm water. This was followed immediately by loss of consciousness, lasting five minutes, by permanent tinnitus and deafness, and persistent pain. A purulent discharge from this ear set in eight days subsequently, and the deafness on the left side was aggravated. This was followed by vertigo, disturbances of muscular coördination, insomnia, faulty nutrition, and suicidal impulses. MIOT ascribes these symptoms to a violent hyperæmia of the labyrinth complicated with a slight apoplexia sanguinea. S.

19. BOUCHERON describes the varying effects of the increased air pressure in the detonation of fire-arms, according as the tubes are patent or closed. The tubes being open, there is no resultant excessive compression of the membrane or of the labyrinth as takes place in the opposite condition. The author bases these assertions upon the observed effect of compressed air upon the ear in a diver's bell. A healthy individual with unobstructed tubes will not feel the increased air-pressure, the air pressing equally upon both surfaces of the membrane.[1] In obstruction of the tubes, the air only presses upon the outer surface of the membrane, forces it inwards, presses the stapes into the labyrinth, and, notwithstanding the aqueducts of the labyrinth, divert some of the pressure, the labyrinthine nerves are acted upon. The aqueducts, which normally act as safety valves, are insufficient to divert the pressure in these pathological conditions. The result is a feeling of painful pressure in the ear, impairment of hearing power, tinnitus, and even vertigo. These disagreeable sensations may be obviated by swallowing at the moment of the detonation, thus establishing an equilibrium of pressure between the external

[1] This assertion and the folllowing deductions based upon it by the author, are incorrect. According to my experimental investigations in the pneumatic cabinet (*vide Du Bois Reymond's Arch. f. Physiol.*, Bd., i.), in increased air-pressure no air passes through the tubes into the middle ear under normal conditions, except during the act of swallowing.—HARTMANN.

and internal columns of compressed air. Boucheron's observations of the effect upon the ear of the air compression resulting from detonation in the open air, serve as additional proofs of the above. Here, also, only in cases of obstruction of the tubes, are any annoying symptoms noticeable. The author had opportunity to carefully observe three such cases. He calls attention to the fact, that very temporary occlusion of the tubes is a frequent occurrence, and that, when the detonation takes place at the moment of transient obstruction, more or less injury to the labyrinthian structures must result. An examination immediately after the injury, may reveal the tubes perfectly patent. This will explain why a detonation will produce no effect at one moment and at another may be followed by ear symptoms.

Boucheron considers compression of the fibres of the acoustic nerve, at their point of entrance into the labyrinth, the principal lesion following powerful reports. He calls it an "anæsthetic" or "destructive" compression. In the most severe cases, a rupture of the axis-cylinder, with subsequent atrophy of the nervous peripheric end and the perception cells topically dependent on it, may take place. The author devotes a special chapter to the deafness of coppersmiths and boiler-makers, and, similarly, to the otopiésis following detonations, attributes it to the effect of increased air-pressure during a temporary occlusion of the tubes. He considers injuries to the membrane, hemorrhages, etc., as of but secondary importance, or mere complications; on the contrary, the presence of a perforation may ward off the excessive labyrinthine pressure by rapidly equilibriating the air-pressure on both sides of the drum-membrane. The treatment should be mainly prophylactic, by keeping the tubes pervious at the moment of the detonation. This is best accomplished by going through the act of swallowing or by inflating the ears. Labyrinthine lesions, such as anæsthesia of the nerve filaments, get better of themselves or are cured by galvanism. More serious injuries, as rupture of the nerve fibres or trophic changes of the sensory cells, are incurable. S.

20. In dwelling upon the causes of deaf-mutism, BOUCHERON points out, that naso-pharyngeal diseases form an important factor in the pathogeny of infantile deafness followed by mutism. The deaf-mutism developing suddenly at a certain period after birth, is characterized either by the presence of meningitic or epileptiform symptoms, or by an absence of convulsive symptoms, and,

accordingly, can be divided into two categories. In both instances the deafness arises from an anæsthesia of the nerve filaments, the result of an increased intra-labyrinthine pressure; subsequently, a destruction of the acoustic filaments takes place. Boucheron suggests for it the term "deafness, due to otopiésis." Experimental studies, made upon dogs, have caused the author to regard occlusion of the sieve- or sponge-like arrangement within the aqueductus vestibuli, the safety valve which normally prevents the development of otopiésis, as the most important cause of the latter. In treating of the symptomatology, Boucheron recognizes three forms: the "otopiésis pseudo-meningitique," the "otopiésis pseudo-epileptique," and a simple form of otopiésis. The first form can again be subdivided into two categories,—the inflammatory and the non-inflammatory.

Examination with the mirror generally shows a normal appearance of the external ear and the drum-membrane, or the frequent picture of retraction with normal color of the latter. An acute exacerbation of the naso-pharyngeal catarrh, which is almost always present, will, however, often produce a sudden reddening of the membrane, with marked hyperæmia of the handle of the hammer. Extensive destruction of the membrane and the ossicles, caries, or necrosis of the temporal bone are comparatively rarely seen. He alludes to the frequency of naso-pharyngeal affections, of tubal and middle-ear catarrhs in deaf-mutes, and to the varied effect they have upon the main condition by frequent relapses and remissions. The author does not regard the deafness occurring in the offspring of consanguineous marriages the result of a race degeneration, but rather as an additional circumstance of an inherited catarrhal predisposition. He inclines to the belief, that cases of true congenital deafness are fewer in numbers than heretofore accepted.

According to Boucheron, the treatment must first of all have in view the prevention of the formation of a vacuum in the tympanic cavity; secondly, the restoration of the mobility of the drum membrane and ossicles, especially the stapes; thirdly, measures to overcome the inherited catarrhal tendency and treatment of the tubal catarrh; fourthly, irritation of the anæsthetic labyrinthine nerves; fifthly, education of the hearing sense, after it has been sufficiently restored to perceive speech; sixthly, instruction by artificial methods should no improvement take place or the power of hearing prove insufficient. S.

21. DELSTANCHE publishes the case of a patient, aged fifty-eight years, whose head was firmly seized between the hands of a comrade, this act being followed instantly by complete bilateral deafness. Catheterization proved of no avail, while instant relief followed the application of the rarefactor. The author is of the opinion that the stapes was fored into the oval window by the compression, and that it was again restored to its normal position by the air-exhausting action of the "raréfacteur."

22. KIRCHNER brushed the membrane with a 10 % solution of cocaine and reduced its sensibility sufficiently to make a free incision in a case of purulent middle-ear inflammation without producing any pain.

In similar cases, its use rendered paracentesis in thickening of the membrane, sections of the anterior and posterior folds, tenotomy of the tensor tympani, and division of the handle of the hammer, near the processus brevis, almost painless, whilst again in other cases it seemed to have no effect. The variable action of cocaine in different individuals induces Kirchner to advocate the use of a 20 % solution in operations upon the drum membrane. Its use also enables us to make more frequently important operations upon the membrane and the ossicles. S.

23. ZAUFAL'S experience leads him to confirm the good effects of cocaine in reflex neurosis of the nasal origin. The use of cotton plugs soaked in a 5 % solution of cocaine in a severe case of acute coryza, with turgescence and great swelling of the nasal mucous membrane on both sides, produced marked relief, freer nasal respiration, and checked the purulent secretion. The course of another case of coryza was entirely checked by one application of a 5 % solution. The use of cocaine in a third case provoked a severe attack of coryza. The anæsthetic effect of cocaine upon the external meatus is by no means as certain and striking as when used upon the nasal or pharyngeal mucous membrane. Special caution must be taken in judging of the effect of cocaine in this regard, as the sensibility of the membrane varies materially in different individuals both physiologically and in pathological conditions. The insensibility of the membrane must not be ascribed to the effect of the cocaine before previous palpation with a probe or pricking with a paracentesis needle. The author has observed a decided analgesic action of the drug in only five cases of acute inflammation of the middle ear. The use of cocaine will prove beneficial in controlling the

pain in acute myringitis and acute otitis media, and its use can be controlled till spontaneous rupture of the membrane takes place. The application of a 20 % solution in furunculosis of the external meatus will reduce the sensibility sufficiently to permit pressure on the outer ear, traction upon the auricle, and mastication without calling forth any pain. S.

24. BARATOUX has used cocaine with decidedly good results in the removal of nasal and aural polypi, in galvano-caustic applications to the tubes and to the nose, and in the opening of abscesses in the external auditory meatus. He also observed its anæsthetic effects in galvano-caustic operations in the nose, ear, pharynx, and upon the tonsils. Its use rendered catheterization possible in exquisitely sensitive patients. Paracentesis of the drum-membrane was painlessly performed a few minutes after introducing some of a 5 % or 10 % solution of cocaine into the drum cavity, and at the same time instilling a few drops of the same solution into the external meatus. Excepting its paralytic effect upon the senses of taste, olfaction, and hearing, the author lauds the application of 10 % or 20 % solutions in acute coryza and otitis. The use of a 1 % solution will diminish hypersecretion in nasal catarrh and in catarrhs of the middle ear. MOURE also adds his experience in anæsthetizing the larynx. S.

25. STEIN considers cocaine a valuable anæsthetic in facilitating catheterization, in allaying the pain in acute otitis media, and in the removal of aural polypi. He also observed its good effect in diminishing suppuration in uncomplicated cases of middle-ear inflammation. S.

26. LANGE'S experience induces him to discourage too sanguine expectations regarding cocaine as a local anæsthetic. In glancing over the literature of this subject, the great discrepancy in the strength of the solutions used by European and American observers is striking. He attributes this to a difference in the quality of the drug, to the age of the watery solution, to the manner of application, to the part of the body to which it is applied, and to individual susceptibility to the action of the drug. He himself has derived partial success from the use of a 10 % solution, and he expresses the hope that more extended observations, establishing indications for its use and proper mode of application, will enhance its possibilities. A reduction in the price of the drug is a determining factor.

27. COUSINS describes a new instrument which is to serve as

an insufflator of air into the middle ear, and secondly as an evacuator of secretion from the tube and of air from the external meatus. It is also useful as a means of introducing deodorizing vapors into the middle ear. S.

28. SEMON calls attention to a new pocket battery for illuminating the various cavities of the body; it will produce also either the faradic, galvanic, or electrolytic current. The author has found it serviceable in illuminating the nose and ear. S.

29. The second edition of a business advertisement of the antiphone. Written apparently in scientific terms, its purpose to serve as an advertising scheme is so evident that, totally ignoring its contents, it does not deserve even passing notice. S.

EXTERNAL EAR.

30. Dr. A. EITELBERG. Gangrene of the auricle. *Wiener med. Wochenschr.*, No. 21, 1885.

31. Dr. SCHWABACH, of Berlin. Pathology of the cartilage of the auricle. *Deutsche med. Wochenschr.*, No. 25, 1885.

32. Dr. W. KIRCHNER, of Würzburg. Pityriasis versicolor of the external auditory meatus. *Monatsschr. f. Ohrenheilk.*, etc., No. 3, 1885.

33. Dr. NOQUET. A case of hypertrophic "syphilides papulo-erosives" of the external auditory meatus. *Le Progrès méd.*, No. 17, 1885.

34. Dr. BARATOUX. Syphilitic gummata of the drum membrane. *Bulletins et mémoires de la société Française d'otologie*, etc., tome ii., p. 176.

35. ARTHUR BENSON. Ivory exostosis of the auditory meatus. *British Med. Jour.*, 1885, p. 790.

36. GEORGE P. FIELD. On aural exostosis. *Lancet*, 1885, p. 980.

37. Dr. DELIE, of Ypres. Two cases of foreign bodies in the ear. *Bulletins et mém. de la société Franç. d'otologie*, etc., tome ii., p. 167.

38. Dr. NOQUET, of Lille. Two cases of foreign bodies in the ear. *Ibid.*, p. 169.

39. Dr. BACON. Injuries of the membrana tympani. *Med. Record*, April 11, 1885.

40. HUGO THOMAS. Congenital absence of the auricle and external meatus. *British Med. Jour.*, p. 26, 1885.

41. Dr. EZRA DYER. Fistula of the antitragus. *Med. News*, p. 24, 1885.

30. EITELBERG describes a case of gangrene of the auricle occurring in a boy aged thirteen months. Antiscrofulous treatment and local applications of a preparation of tar exerted but little effect, the case ending fatally five days after coming under observation. The other case, one of dry gangrene, affected the auricle of a poorly nourished girl, aged three weeks. The lower portion of the auricle was completely separated from its insertion; this case also terminated fatally. S.

31. SCHWABACH has collected all the cases of ossification of the cartilage of the auricle on record, and describes a case which came under his own observation. It occurred in a man aged fifty-nine years, who claims that ossification on both sides has existed since early youth. The upper and posterior part of the helix, the scaphoid fossa, the antihelix, the two crura of the latter, and the triangular fossa were all completely ossified. The concha itself appeared to the touch but slightly firmer than normally. Both tragus and antitragus were not involved.

Schwabach also publishes a case of perichondritis auriculæ. The trouble originated from a furuncle in the external meatus. A sac, the size of a walnut, containing a quantity of thin, viscid fluid, was freely incised. After two months healing was complete, but resulted in a shrunken and deformed auricle.

32. In the case of pityriasis versicolor of the external meatus described by KIRCHNER, the patient, a man aged twenty, had been treated for the same disease on other parts of the body. The principal symptom, was that of violent itching in the ear; pain, tinnitus, and impairment of hearing were not complained of. On examination the yellowish-brown discolorations and furfuraceous desquamation, similar to those found in the other parts of the body attacked, were also seen here. The parasitic nature of the disease was readily determined by microscopic examination. The repeated applications of equal parts of ol. cadini and alcohol produced a complete cure within three weeks.

Kirchner also records a case of psoriasis affecting the external meatus.

33. NOQUET describes a case of condylomata in both external auditory canals, occurring in a man who, six months before, had contracted the initial sore and who also had suffered from an otorrhœa. Constitutional treatment produced a rapid disappear-

ance of these excrescences. Local treatment consisted of injections of warm water, subsequent instillations of solutions of corrosive sublimate, and cauterizations. Cure complete within three months. S.

34. BARATOUX observed two small gummata upon the membrana tympani of a syphilitic person. The parts healed readily, without any perforation of the membrane, under anti-syphilitic treatment. S.

35. BENSON reports the removal of an ivory exostosis from the external meatus of a man, aged thirty-three years. One year after its removal, no recurrence of the growth had taken place. The hearing, which was greatly impaired prior to the operation, was completely restored, and the author advises the removal of all exostoses in the auditory canal—even those which do not completely block up the meatus. S.

36. FIELD operated a case of exostosis similar to the one described above, and here also the removal of the growth was attended by complete restitution of hearing power. This fortunate result induces the author to advise an operation in all similar cases—not without, however, calling the patient's attention to the possible danger attending the operation. S.

37. DELIE removed a white worm from the ear of a laborer who, in cleaning a sewer, had bent over so far that both ears came in contact with the water. The terrible suffering almost drove him to commit suicide. Complete relief followed the removal of the worm.

Delie also mentions a case of fainting and dizziness occurring in a person who, in attempting to cleanse her ear, had forced a plug of inspissated cerumen against the membrane. S.

38. In two cases, described by NOQUET, the foreign bodies were successfully removed by syringing with warm water. S.

39. BACON published the following cases of injury to the membrane. First case: Perforation of the membrane by a lead pencil. Second case: Rupture of the membrane, produced by a blow of the fist. Third case: Probable rupture of the membrane, due to a blow upon the mastoid process; paralysis of the facial nerve. Fourth case: Probable rupture of the membrane after a blow. Fifth case: Fracture of the base of the skull, perforation of the membrane, hemorrhage from the right ear, and from the mouth; bilateral facial paralysis. Sixth case: Perforation of the membrane by a hair-pin. Seventh case: Injury to the membrane,

consequent upon an unsuccessful attempt to remove a foreign body from the ear. The entire membrane was destroyed.

S. M. BURNETT.

40. THOMAS records a case of congenital absence of the auricle and the external meatus. The inner ear was intact. S.

41. The fistula, described by DYER, was 1 *cm.* long, and from it was a constant discharge of pus, extremely annoying to the patient. After repeated attempts, the author produced a complete obliteration of the cavity, by introducing a platinum wire and heating it by a galvanic battery. S.

MIDDLE EAR.

42. Dr. A. EITELBERG, of Vienna. Lucæ's pressure-probe in the treatment of diseases of the sound-conducting apparatus. *Wiener med. Presse*, 1885, p. 174.

43. C. ATKIN. Natural drainage in otorrhœa. *Brit. Med. Journ.*, 1885, p. 235.

44. Dr. GUILLEMARD. On chronic otorrhœa. *Ibid.*, p. 792.

45. M. JACCOUD. Suppurative inflammation of the middle ear. *Gazette des hôpitaux*, No. 39, 1885.

46. Dr. ALLPORT. Peroxide of hydrogen in aural therapeutics. *Med. Record*, March 16, 1885.

47. C. H. BURNETT. The local application of salicylate of chinolin in diseases of the ear. *The Policlinic*, May 15, 1885.

48. Dr. J. HABERMANN, of Prague. Tuberculosis of the ear. *Prager med. Wochenschr.*, No. 6, 1885.

49. WEBER-LIEL. The treatment of superficial caries and necrosis of the meatus and of the tympanic cavity with sulphuric acid. *Monatschr. f. Ohrenheilk.*, No. 4, 1885.

50. GORHAM BACON. The surgical treatment of mastoiditis, with cases. *Annales des mal. de l'oreille*, etc., No. 2, 1885.

51. LOEWENBERG. The treatment of mastoid suppuration without trepanation. *Gazette des hôpitaux*, No. 45, 1885.

52. D. J. BARATOUX. Necrosis of the temporal bone. *Revue mens. de laryngol.*, etc., No. 10, 1885.

53. WALTER PYE. Necrosis of labyrinth. *Lancet*, Feb. 21, 1885.

54. DALBY. Perforation of the mastoid cells. *Lancet*, No. 5, 1885.

55. Dr. GARRIGOU-DÉSARÈNES. Gun-shot injury of the mastoid process. *Revue mens. de laryngol.*, etc., No. 3, 1885.

56. Dott. EUGENIO MORPURGO. Is an early or later surgical interference advisable in diseases of the mastoid? *Bollettino delle Mal. dell'Orrechio*, etc., Anno iii., No. 2.

57. Dr. HESSLER, of Halle. Clinical contribution to the surgical treatment of mastoid suppuration. *Arch. f. Ohrenheilk.*, Bd. xxi., p. 105, and Bd. xxii., p. 1.

42. Excepting two cases, in which the use of the pressure-probe increased the range of audition from 30 to 50 *cm.*, EITELBERG was not able to notice any permanent benefit from its use in cases of sclerosis. Contrary to expectations, in a few instances he observed a gradual decrease of hearing power without any symptoms of subacute affection of the middle ear. Excluding one case, he was not able to notice any marked improvement in hearing, in combining this treatment with a subsequent inflation of the ear. The effect of the pressure-probe upon the tinnitus was of but transitory benefit, this symptom generally returning a few hours later. Only in one case was the subjective tinnitus improved by this mode of treatment. The author, in conclusion, doubts the utility of this method in the treatment of middle-ear catarrhs in general. S.

43. ATKIN denounces the usual methods of treating otorrhœa by packing the ear with powders or filling it with drops, and occluding it with cotton pledgets. The dangers thus incurred, especially when an occlusion of the Eustachian tube coexists, is illustrated by a case in which this mode of treatment was carried out. The pent-up pus did not penetrate into the mastoid cells, but was discharged intermittently as fetid masses through the nose, producing ulcerations in the vault of the pharynx. S.

44. GUILLEMARD treats of the various modes of treating otorrhœa, and regrets the indifference of the laity to this disease. At the same time, he points out the necessity of including a course on Otology in the general curriculum of medical education.

45. A phthisical patient of JACCOUD'S complained of sudden pain and deafness in the right ear. In the evening of the same day a profuse discharge set in, which was next day followed by violent dizziness and emesis; the region of the mastoid became painful to touch. The vertigo increased in severity, with no signs of fever. The presence of tuberculosis induced the author to give an unfavorable prognosis. This was verified as, two days later,

fever set in and sixty hours later the patient died. Temperature had never risen above 38.6°.

An autopsy revealed an accumulation of pus at the base of the middle lobe of the cerebrum, and a drop of pus in the dura mater at the inner orifice of the right internal auditory meatus. The tympanic cavity contained sprouting granulations, roughened walls, and communicated with an anomalous cavity containing pus situated in the petrous portion of the bone. The surface of the bone was exposed and necrotic, and the membrana tympani was entirely destroyed. S.

46. ALLPORT regards the peroxide of hydrogen a valuable cleansing agent in the treatment of chronic suppuration of the middle ear. Prior to instilling this agent, the meatus is thoroughly cleansed with cotton. The generation of bubbles of gas denotes the chemical destruction of the pus. As soon as this has ceased, the ear is cleansed and fresh quantities of the peroxide are used till the pus is destroyed. Finally, the parts are carefully cleansed and the usual remedies applied. S. M. BURNETT.

47. On account of its irritating properties BURNETT now seldom uses the chinolin alone, but combines the powder with sixteen parts of finely pulverized boracic acid. In addition to its use in chronic suppuration of the middle ear, he finds it the best agent to prevent the growth of aspergillus. S. M. BURNETT.

48. The idea previously entertained, that caries of the petrous bone is a tuberculous disease, which is first established in the mucous membrane of the middle ear, and leads to its ulceration and disintegration, and subsequently attacks the underlying bone, has been strengthened by an observation of HABERMANN. The latter had an opportunity to examine, *post mortem*, the ear of a phthisical patient, and found miliary tubercles and bacilli in the diseased mucous membrane of the middle ear.

As regards the mechanism of the infection of the tympanic cavity through infectious virus, the author assumes that small particles of sputa containing tubercle-bacilli are readily forced through the Eustachian tube into the drum cavity during the act of coughing, and that this may occur the more readily in tuberculous patients, since in them the tubes are usually very permeable. S.

49. Sulphuric acid has proved a most valuable agent in the hands of WEBER-LIEL for the cure of circumscribed caries, and for the elimination of necrotic portions of the external meatus and middle ear. He, at first, applies the acid on the point of a

notched and furrowed silver probe to the granulations. After the granulations have been thoroughly removed, he then applies, for a few seconds, a cotton-covered probe soaked in the acid to the diseased bone. The success of this mode of treatment is illustrated by a case. Weber-Liel has also observed decidedly good results following the use of diluted sulphuric acid, as recommended by Mathewson (a solution of acid, 1 : 3, is warmed and instilled three times daily).

50. GORHAM BACON publishes three cases of mastoid abscess with caries and necrosis, which were cured by incisions and the removal of a sequestrum. Although hemorrhages had taken place repeatedly from the ears in the second case, the author with regard to the condition of the ear merely states that the external canal was filled with pus, and that the mastoid process was the seat of a fistulous opening. In the third case, an examination of the auditory meatus and the drum membrane was apparently considered superfluous by the author. Whether or not the opening of the abscess was followed by recovery, is not stated.

In addition to these clinical cases, Bacon devotes some space to general remarks on mastoiditis, and in conclusion says that he considers sulphide of calcium a most valuable agent in the treatment of this disease.

51. LOEWENBERG considers it advisable, ere resorting to operative procedures in mastoid suppuration, to adopt measures to promote the natural discharge of the accumulated pus, and to institute a thorough antiseptic treatment. In case of necessity, the abscess should be opened, drained, and irrigated with absolute alcohol. The adoption of these measures will in many cases, he thinks, obviate the necessity of trephining the mastoid process, a procedure which he seems to regard as a *dernier ressort* in the treatment of mastoid suppuration. S.

52. BARATOUX publishes a case of otorrhœa complicated with caries and necrosis of the petrous bone. Notwithstanding the upper wall of the auditory canal and the roof of the tympanic cavity were involved in the process, no cerebral symptoms were present. A sequestrum, prismatic in shape, 15 *mm.* in breadth and measuring in its denser parts about 3 *cm.* in circumference, was removed.

During the entire course of the affection, from the beginning of the discharge to the removal of the sequestrum, no cerebral or meningeal symptoms had ever been present. S.

53. Removal of a sequestrum, in a child aged four and a half

years, who suffered of an abscess behind the ear. On the corresponding side, there were complete deafness, paralysis of the facial nerve, and indications of corneal irritation. The sequestrum was removed after opening the abscess and enlarging the cavity.

54. Later observations have induced DALBY to modify the views which he has formerly expressed, as to the indications for opening the mastoid, such as pain, œdema, increase of pain in the mastoid region when in a horizontal posture, high temperature, and chills. Of late, he has repeatedly found purulent accumulations in the mastoid cells, in cases in which the outer plate was not diseased and in which one or more of the above-mentioned constitutional symptoms were wanting. He now advises an operation, even if the bone appears healthy, as soon as the general symptoms point to an accumulation of pus in the mastoid. In operating he prefers the use of a drill or perforator with a collar attachment. One disadvantage of this instrument, as he himself admits, is that occasionally but one of the cells is opened. In case no free communication exists between the cells, the opening of one will not be sufficient to procure thorough drainage, and the object of the operation will therefore not be attained. Although this eventuality could not occur in the use of the chisel and mallet, the author is inclined to discountenance the latter as being too violent a procedure.

55. GARRIGOU-DÉSARÈNES reports the case of a patient suffering from otorrhœa on his right side, who, in an attempt to commit suicide, fired a pistol bullet measuring 7 *mm.* in diameter into the external part of the auditory canal. The profuse hemorrhage was checked, but all attempts to locate the projectile, even with the electric bullet-seeker of Trouvé, were futile. Continued injections of a mixture of alcohol and water and dilatation of the fistulous tract by means of laminaria bougies prevented the development of grave symptoms. Six months later the bullet was discovered and removed from the interior of the auditory canal. The author suggests the injection of solutions of nitric acid into the canal of the wound in all those cases in which the bullet cannot be definitely located, and the treatment of the returning fluid, which should be caught up in a white porcelain bowl, with iodide of potash, whereupon a yellowish precipitate, the iodide of lead, will form, if a bullet is present. S.

56. MORPURGO, in his paper, arrives at the following conclusions :

1. Thanks to improved methods of operating, the dangers of injury to vital organs can be mostly avoided in opening the mastoid. In comparison with the grave indications demanding the operation, these accidental dangers can have but little weight.

2. It is impossible to fix the limit of the period of non-operative treatment ; but it must be borne in mind that by waiting for the development of graver symptoms the operation is made illusory.

3. Wilde's incision should be made as early as possible.

4. Neuralgic pains, even when not accompanied by fever or other grave symptoms, may be an indication for opening the mastoid.

5. Abscesses in the mastoid region arising during the course of a purulent middle-ear inflammation, should be incised freely to the underlying bone, to facilitate the examination of the latter.

S.

57. HESSLER follows the example of Schwartze in publishing his operations for the relief of diseases of the mastoid process, and reports thirty cases. Space will not permit a detailed review of these cases, and the reader is therefore referred to the original article.

INNER EAR.

58. Prof. A. POLITZER. A contribution to the pathology and treatment of affections of the labyrinth. *Wiener med. Presse*, No. 4, 1885.

59. Same author. The treatment of affections of the labyrinth. *Wiener med. Blätter*, No. 4 and subsequent numbers.

60. THOMAS BARR. Observation of two cases of sudden and extreme loss of hearing on both sides, owing to disease of the nervous structures of the ear, materially improved after the hypodermic use of pilocarpine. *British Med. Jour.*, p. 1192, 1885.

61. M. MÉNIÈRE. Deafness due to mumps. *Bullet. et mém. de la société franç. d'otologie*, etc., tome, ii., p. 105.

62. Dr. BERNO BAGINSKY, of Berlin. On Ménière's complex of symptoms, and the disturbances of equilibrium induced by cerebral affections. *Berliner klin. Wochenschrift*, No. 5, 1885.

58. POLITZER publishes the post-mortem examination of a patient whose disease had been diagnosed a leucæmic affection of the internal ear. The scala tympani was filled with new-formed connective tissue, traversed by an osseous reticulum in connection with the wall of the cochlea. Politzer also published

the microscopical examination of a transverse section of the petrous portion of the temporal bone taken from a child aged 2½ years, which, in consequence of an acute inflammation of the labyrinth, had become deaf and dumb. The cochlea, semicircular canals, and vestibule were filled with a bony mass which was formed by the metamorphosis of the new-formed connective tissue, resulting from the inflammation. He has obtained good results from the use of pilocarpine in cases of recent syphilis of the labyrinth and in other labyrinthine diseases of recent date, but this drug had little or no effect in cases of hereditary syphilis and panotitis. S.

59. POLITZER has used pilocarpine since 1879, in the treatment of syphilitic labyrinthine diseases, and later he extended its use to acute and chronic affections of the labyrinth. In order to determine the action of the drug, no local and no other internal treatment was instituted. The pilocarpine treatment was effective in cases of syphilis of the labyrinth of recent standing, and less so in the cases in which the disease of the labyrinth is complicated with adhesive middle-ear processes and in which there exists at the same time a parenchymatous keratitis. These cases are now generally regarded as due to hereditary syphilis. But one cure was effected in eight of such cases. Treatment was ineffectual in those cases of labyrinthine disease in which the anatomical lesion or etiology was indefinable.

60. A case of sudden bilateral nervous deafness, affecting a man, aged twenty-two years, who six months previous had contracted syphilis, was cured by injections of pilocarpine. In another case of nervous deafness, occurring in a man, aged thirty-four years, with no history of syphilis but presenting objective symptoms of an old middle-ear catarrh, the power of hearing was greatly improved by the use of pilocarpine. S.

61. Publication of two cases of deafness following parotitis. In the first case, deafness developed in the right ear, without any previous otitis or otorrhœa, four days after the outbreak of the mumps. The other case was that of a girl, aged eleven, who in 1879 became deaf in the right ear during an attack of mumps. The author attributes the deafness to an involvement of the meninges, the symptoms of the latter being overlooked. MIOT opposes this view and considers an affection of the labyrinth the essential factor of the deafness. S.

62. The high-handed and curt manner with which BAGINSKY

overwhelms all investigators who have attempted to solve the question as to the causes of the disturbances of equilibrium, be it experimentally, clinically, or pathologico-anatomically, is indeed astonishing. It is still more surprising, that an author should invite attention to an elaborate article with a high-sounding heading, which adds absolutely nothing to the solution of the points in question. It is possible, that the author may possess certain new experimental data, but they are not discoverable in this publication. In case they should be published at some future date, a more modest demeanor on part of the author would assuredly not diminish the weight of their evidence. S.

NOSE AND NASO-PHARYNX.[1]

63. Dr. W. KIESSELBACH, of Erlangen. Eczema introitus narium. *Monatsschr. f. Ohrenheilk.*, etc., No. 2, 1885.

64. Dr. W. MOLDENHAUER, of Leipzig. So-called eczema of nasal orifice. *Ibid.*, No. 5, 1885.

65. Dr. E. BAUMGARTEN, of Budapest. Eczema introitus narium. *Ibid.*, No. 5, 1885.

66. ALFRED KEBBEL, of Flaxton. Tincture of benzoin in influenza and catarrh. *Brit. Med. Journ.*, 1885, p. 43.

67. Dr. H. M. FRENCH. Nasal catarrh. *Med. News*, June 27, 1885.

68. JOHN N. MACKENZIE, of Baltimore. Notes on the classification, diagnosis, and treatment of the stages of chronic nasal inflammation. *Med. News*, April 4, 1885.

69. WM. C. JARVIS. The etiology and treatment of nasal catarrh, with special reference to the deviated septum, with presentation of instruments. *Ibid.*, March 14, 1885.

70. Dr. W. ROTH. Diagnosis and treatment of reflex neuroses due to nasal disease. *Wiener med. Presse*, No. 1, 1885.

71. Prof. WILHELM HACK, of Freiburg. The surgical treatment of asthmatic conditions. *Berliner klin. Wochenschr.*, Nos. 21 and 22, 1885.

72. Dr. JULIUS SOMMERBRODT, of Breslau. Nasal reflex neuroses. *Ibid.*, No. 10, 1885.

73. M. TERILLON. The relation of nasal mucous polypi to asthma. *Progrès méd.*, No. 14, 1885.

[1] In reviewing an article of Czarda's in the last Report (vol. xiv., Nos. 2 and 3, p. 236) we copied a misprint occurring in the original in the *Gaz. méd.* Instead of 7 grm. and 25 grm. read 0.7 and 2.5 grammes.

74. Dr. FINKE, of Halberstadt. Epilepsy cured by the removal of nasal polypi. *Deutsche med. Wochenschr.*, No. 4, 1885.

75. HARRISON ALLEN. On a new variety of chronic nasal catarrh. *Med. News*, No. 6, 1885.

76. Dr. ZIEM, of Danzig. Rose catarrh. *Monatsschr. f. Ohrenheilk.*, etc., No. 6, 1885.

77. Dr. E. J. MOURÉ. Prognosis and treatment of atrophic coryza or ozæna. *Revue mens. de laryngol.*, etc., No. 6, 1885.

78. Dr. KATZ, of Berlin. A report of some nasal or naso-pharyngeal cases. *Berliner klin. Wochenschr.*, No. 24, 1885.

79. Dr. THEODOR HERING, of Warsaw. The use of chromic acid as a caustic in diseases of the nose, pharynx, and larynx. *Berliner klin. Wochenschrift*, No. 11, 1885.

80. Dr. L. RETHI. Chromic acid as a caustic in diseases of the nose, pharynx, and larynx. *Wiener med. Presse*, No. 14, 1885.

81. Prof. E. ZAUFAL. The surgical treatment of hypertrophy of the posterior turbinated bones. *Wiener med. Presse*, No. 15, 1885.

82. TERILLON. Hypertrophy of the mucous covering of the inferior turbinated bones. Its nature and treatment. *Progrès méd.*, No. 20, 1885.

83. Dr. BAYER, of Brussels. Osseous cyst of the left middle turbinated bone. *Semaine méd.*, April 8, 1885.

84. Dr. WOAKES. Necrosing ethmoiditis and mucous polypi. *Lancet*, p. 6195, 1885.

85. THUDICHUM. Inflammation, abscess, and new growths of the ethmoid cells. *Brit. Med. Journ.*, p. 136, 1885.

86. PANAS. Pathology and treatment of exostoses of the frontal sinus. *Gaz. des hôpitaux*, No. 43, 1885.

87. TRÉLAT. Palliative operations in the treatment of naso-pharyngeal tumors. *Gaz. des hôp.*, No. 48, 1885.

88. M. CORNIL. Rhino-scleroma. *Gaz. hebd.*, No. 14, 1885.

89. Dr. PAYNE and F. SEMON. Rhino-scleroma. *Med. News*, March 7, 1885.

90. Professor SCHRÖTTER, of Vienna. Congenital bony occlusion of the nares. *Monatsschr. f. Ohrenheilk.*, etc., No. 4, 1885.

91. A. W. SINCLAIR. Removal of a leech from the posterior nares. *Brit. Med. Journ.*, page 1246, 1885.

92. Dr. PAUL KOCH. Contribution to the study of foreign bodies in the nose. *Annales des mal. de l'oreille*, etc., No. 1, 1885.

93. Dr. RUSHTON PARKER, of Liverpool. Removal of a gun-breech and ball from the nose after five years. *Lancet*, Feb. 28, 1885.

94. C. BABER. Treatment of adenoid vegetations of the pharynx. *Brit. Med. Journ.*, page 603, 1885.

95. Dr. P. HEYMANN, of Berlin. The use of cocaine in the larynx, pharynx, and in the nose. *Berl. klin. Wochenschr.*, No. 5, 1885.

96. Prof. Dr. SCHNITZLER. Cocaine in diseases of the nose, pharynx, and larynx. *Wiener med. Presse*, No. 4 ff., 1885.

97. CRESWELL BABER. The action of cocaine on the nasal mucous membrane. *Brit Med. Journ.*, page 479, 1885.

98. J. STRAHAN. Cocaine in acute affections of the upper respiratory passages. *Ibid.*, page 1197, 1885.

99. W. S. PAGET. Cocaine in coryza. *Ibid.*, page 430.

100. C. A. OWENS. Cocaine in hay-fever. *Ibid.*, page 1034.

101. Dr. H. KRAUSE, of Berlin. A modified nasal snare, a laryngeal curette, and a nasal cotton-carrier. *Monatsschr. f. Ohrenheilk.*, etc., No. 4, 1885.

102. J. WARD COUSINS. New adjusting tongue depressor, *Med Times*, Feb. 21, 1885.

63. According to KIESSELBACH eczema of the nostrils may be due to an extension of this disease from adjoining skin, or, as is most generally the case, due to an acute or chronic nasal catarrh. The disease is observable in its various stages, such as inflammatory congestion and tumefaction, excoriations, fissures, vesicles, pustules, and formations of crusts. The eczema may lead to so-styled scrofulous swelling of the upper lip, tumefaction and congestion of the external nose, and to recurrent attacks of facial erysipelas. During its acute stage, all active measures had better be omitted. Only the application of bland, unirritating agents, such as warmed grease or vaseline, is advisable. Kiesselbach has used Hebra's ung. diachyl. or the ung. hydrag. praec. albi mixed with lard with good effect in the subacute or chronic forms of this disease. According to his experience, these salves are most efficiently applied by using bulb-pointed glass rods.

64. MOLDENHAUER calls attention, in a supplement to the

above-mentioned publication, to the fact that the disease discussed includes two different affections, varing from each other pathologico-anatomically and clinically, namely eczema and sycosis. In adults the formation of crusts is almost without exception due to sycosis. A characteristic condition is the involvement of the hair-bulbs, with subsequent hypertrophy of the cutis. In treating sycosis, Moldenhauer, removes the hairs with a pair of curved scissors, and then soakes the crusts. Single hairs are best removed with ciliary forceps. More extensive infiltrations require piercing and scarification. This mode of treatment is to be carried out occasionally with the use of nasal douches.

65. BAUMGARTEN treats of the same disease and also advises the removal of the individual hairs with ciliary forceps. He then prescribes anointment of either the white precipitate or yellow oxide of mercury (0.1: 10.0, vaseline) to be applied with cotton.

66. KEBBEL has used the tincture of benzoin for over three years with excellent results in cases of influenza and nasal catarrh. He prescribes it in the form of a nasal inhalation.

67. FRENCH regards nasal catarrh as an hereditary disease, amenable to treatment in mild forms, but only permitting of amelioration in the more pronounced types. His treatment consists of the application of sprays of carbolic acid, carbolate of glycerine, and other remedies. In addition, he advises friction of the skin, good regimen and a hygienic mode of living. S.

68. MACKENZIE classifies the various stages of chronic nasal inflammation, as follows:

I. Simple inflammation (rhinitis simplex), which represents two stages:

(α) exaggerated irritability of the cavernous tissue.

(β) permanent dilatation of this structure.

II. Hypertrophic inflammation (rhinitis hypertrophica), of which there are two periods:

(α) dilatation with hypertrophy

(β) complete hypertrophy.

III. Atrophic inflammation (rhinitis cirrhotica), subdivided into two stages:

(α) beginning atrophy

(β) complete atrophy.

Treatment of the cases embracing the first division should be of a merely hygienic character. In those of the second classification, measures should be adopted to stimulate the contractility

of the cavernous tissue, such as strychnine or electricity, or the use of galvano-cautery or electrolysis. The use of powders is contra-indicated in the hypertrophic form, and surgical measures to keep the respiratory fissure unobstructed are advisable. A generous, tonic diet and strict cleanliness of the nose, to keep the parts continually moist, form the treatment in the atrophic variety.

69. Deviations of the septum, causing obstructions of the nasal passage, are looked upon by JARVIS as the most frequent cause of chronic nasal catarrh. Deviation may be produced by the pressure of the hypertrophied turbinated bones, or by occlusion of the nasal passages. In other cases it is an hereditary condition, or the result of a trauma. The operation for deviation is an essential feature in the treatment of nasal catarrh. He describes the various methods of operating.

70. ROTH sets down the following indications for operative interference in hypertrophy of the nasal mucous membrane, in enlargement of the cavernous structure, and in nasal polypi: 1. In case nasal symptoms are complained of, as in chronic dry nasal catarrh, in chronic rhinorrhœa, in repeated epistaxis, and in recurrent erythema of the skin of the nose. 2. In reflex neuroses which cannot be traced to an organic affection. 3. Reflex neuroses being present, the local disease of the nose being complicated by affections of other organs, such as the lungs, the heart, or the kidneys, the treatment of the nasal condition will materially assist in removing the cause of the disease of the distant organ, and occasionally will produce a marked improvement in the general condition. Roth treats mild cases of hypertrophy, etc., by applying nitrate of silver or chromic acid, making in all five to six applications at intervals of four to five days. Galvano-cautery, however, acts most efficiently and rapidly.

71. HACK'S views regarding the relation of asthmatic conditions to the erectile tissue of the turbinated bones must be well known to all. The essential feature of this publication is a substantiation, based upon an increased experience, of his views as formulated. He expresses fear, and not unjustly, that the danger of attributing too great and all-embracing an importance of the nose to asthmatic troubles, is imminent. In face of this he calls attention to unsuccessful cases occurring within his experience.

72. SOMMERBRODT publishes four clinical cases to strengthen his former assertions that the bronchial mucous membrane may be the seat of reflex vaso-dilatory neuroses originating from the

nose, uncomplicated by asthma. These observations induce him to call attention to the nasal condition in the class of cases termed "chronic catarrh of the bronchioles," or "secondary catarrh." He also describes four cases of migraine caused by cauterization of the hypertrophied turbinated bones. Of fifty-two cases of asthma treated by galvano-cautery, eighteen were entirely cured, twelve were greatly improved, in eight the treatment proved ineffectual, five cases are still under treatment, and the remaining nine failed to report after the first cauterization.

73. TERILLON, in a lecture, points out the relation existing between nasal polypi and asthma, and cites two cases as illustrative. He is decidedly against the use of forceps in removing polypi. He also finds fault with Wilde's snare, and advises the use of a specially constructed forceps, the blades of which can be easily opened after its introduction into the nose, and the polypi, or their pedicles, seized. The reviewer can also find fault with this instrument, a fact which the author himself admits, namely, its unfinished condition. The author reserves all instructions regarding its use till the instrument is finished. His directions regarding the after-treatment of the points of attachment of the polypi are proper, but present nothing new. S.

74. Epileptiform attacks which had developed at a mature age of the patient, were cured by the removal of nasal polypi accidentally discovered. The intelligence of the patient, which had visibly become impaired, was fully restored.

75. ALLEN describes a new type of chronic nasal catarrh, characterized by great thinness of the mucous lining of the nose, with little tendency to become swollen, and a predisposition to bleed readily. The nostrils are generally excoriated during the winter. The nasal secretion is generally mucous, but upon the slightest vaso-motor disturbance, may become very thick in consistency. A fresh cold, a frequent occurrence with women at the menstrual period, will give a purulent character to the secretion, which is discharged in great quantity through the nose and naso-pharynx. According to the author, the structures of the mouth and pharynx present a special appearance in this disease. Individuals of the blonde type, of weakly habitus, with gray or blue eyes, light brown hair, presenting indications of a poor circulation, are specially predisposed to this form of catarrh. They almost all are members of tuberculous families. Prognosis is unfavorable.

S.

76. ZIEM observed a case of repeated attacks of swelling of the face, œdema of the eyelids, in combination with nasal catarrh. The patient, working at a florist's, claims that these attacks are attributable to the odor of roses. Galvano-caustic treatment produced no alleviation. A sojourn of a few weeks in the country was followed by complete disappearance of all the symptoms.

77. Based upon his observations, MOURÉ has come to the conclusion that most cases of atrophic coryza are curable. His mode of treatment is as follows : irrigation of the nose with one or two litres of sulphur-water, subsequently with an addition of salt or soda. Later on he prescribes an antiseptic solution, and follows this by insufflations of antiseptic powders, tannin, alum, citric acid, etc. He lays great stress upon the daily and regular application of the treatment. As experience has shown that at the period of menstruation the secretion becomes greatly increased in quantity and takes on a fetid odor, the continuance of this treatment is especially imperative in girls up to this period. Constitutional treatment consists of tonics, a sojourn in the Pyrenees, and sea-baths. He further advises the use of sea-water as a nasal douche.

S.

78. Publication of a case of sudden nasal hemorrhage in a child aged ten years. According to the author, the child lost four litres of blood in seven days. Hemorrhage was due to a rupture of a blood-vessel in the posterior part of the right nostril, the result of rhinitis. The bleeding was finally checked by a tampon introduced with Belloque's sound. In addition, he describes the removal of a large fibrous polyp, the size of a walnut, completely filling the left choana. The tumor was crushed off with the finger.

S.

79. HERING finds chromic acid the most efficient, and the least painful of all caustics, in the treatment of nasal catarrh. Its use is specially indicated in the cases of hypertrophic nasal catarrh accompanied by occlusion of the nasal passages and by excessive muco-purulent secretion. His method of application is as follows : After the crusts and mucus have been removed by douches of lukewarm water or solutions of borax, the chromic acid is melted on a flattened probe and applied over the greater portion of the enlarged turbinated bone. But little inflammatory reaction, as a rule, follows. The cauterization is only repeated after the eschar has fallen off. The author has used it with success in cases of disease of the sphenoidal cells, an affection

which is most intractable to treatment, extremely chronic in character, and kept up either by swelling of the mucous membrane and a consequent blocking up of its opening, or by the presence of polyps. In a case treated unsuccessfully by galvano-cautery, the use of chromic acid produced such a diminution in the volume of the hypertrophic mucous membrane, that two small polypi situated high up in the nose were discovered and could be removed with a snare.

80. Based upon his observation of sixty cases, RETHI warmly advocates the use of chromic acid as a caustic in hypertrophies of the nasal, pharyngeal, and laryngeal mucous membrane. His methods of comparing the result of this treatment with that of other caustics, such as nitrate of silver or galvano-cautery, were very judicious. He applied chromic acid to one nostril, while to the other he applied some other causttc ; invariably the chromic acid proved to be the most satisfactory. Although the reviewer, whose experience includes fully three times the number of cases given above, can freely confirm the advantageous results of the use of this caustic, he cannot but express some envy that, in spite of all the precautions taken, not one of these brilliant cases should have been followed by some reaction. That occasional vomiting did occur subsequently, is rather covertly expressed between the lines. The prescription, as given by the author for threatening vomiting, is to the reviewer a sufficient evidence that the cauterizations must in some cases have been followed by a reaction.

S.

81. ZAUFAL advocates the use of his wire snare or the galvano-caustic écraseur in the removal of hypertrophies of the posterior extremity of the turbinated bones. In using the latter instrument, the handle is connected with the conducting wires : the wire loop, about $2\frac{1}{3}$–3 *ctm.* long to 2–$2\frac{1}{3}$ *ctm.* wide, is introduced vertically into the nostril and passed along the septum. The handle of the instrument is manipulated by the right hand, while the index finger of the left is passed up the naso-pharynx till the hypertrophied portion can be felt. The wire loop is pushed along the inferior nasal meatus towards the swelling. The index finger of the left hand pushes the loop over the hypertrophy, and by pressing it against the underlying bone holds it in position. The wires are then tightened, drawn in gradually, and the current brought into action. S.

82. TERILLON describes a case of hypertrophy of the inferior

turbinated bone, points out the symptoms in general, and calls attention to the great difficulty of diagnosing an isolated enlargement of the posterior end of the turbinated bone. In enumerating the symptoms, he lays principal stress upon the respiratory obstruction and the varying hyper-secretion. He further explains the reason why the anterior end of the lower turbinated bone is the usual seat of these hypertrophies; the presence of the erectile tissue being of itself a sufficient explanation. In operating, he prefers the use of the galvano-cautery, the patient having been previously anæsthetized.

83. BAYER describes an osseous cyst springing from the left middle turbinated bone. On being punctured with a galvano-caustic needle, a reddish fluid was poured out. Injections of chloride of zinc produced a rapid shrinking of the tumor, the deviated septum assumed its normal position, and the respiratory passage on the right side was fully restored. Soon after another tumor, complicated by exophthalmos, appeared on the right side. A similar course of treatment produced a rapid disappearance of the growth, but the exophthalmos remained. S.

84. WOAKES describes eight cases, in which the symptoms of the presence of nasal polypi were preceded by a necrosing inflammation of the ethmoid cells. In consequence, he expresses his belief that the sequence and correlation of these diseases is the rule. Of course this view has aroused considerable opposition. S.

85. THUDICHUM treats of the symptoms of acute and chronic inflammation of the ethmoid cells. He also describes the various tumors, in part myxomatous and in part cancerous, developing in the cells and eventually producing blindness of both eyes. S.

86. Report of a case of a hard tumor, developing from the frontal sinus, filling the orbit, and producing exophthalmos. A part of it was removed, but the patient was carried off by a meningo-encephalitis. An autopsy showed that the tumor had penetrated into the cerebral cavity, and a communication existed between this cavity and the frontal sinus. In dwelling upon the pathogeny of these tumors, PANAS coincides with Virchow, that they are exostoses—in other words, that they develop from the diploë of the frontal bone.

87. TRÉLAT considers naso-pharyngeal polypi essentially a disease of youth, being at times cured spontaneously by resorption or degeneration, but often requiring surgical interference. He

accordingly advises only the application of palliative measures, such as ligatures, compression, cauterization, and partial extirpation, to enable the youthful patient to arrive at the age at which these growths usually disappear. Only in the cases threatening life should the whole tumor be extirpated. If the patient has almost arrived at the age at which these tumors disappear spontaneously, the treatment should be expectative in character.

88. CORNIL describes a special micro-organism which he has found in the tumors of the septum, nostrils, and nasal passages in rhino-scleroma. Its capsule is hard, hyaline, refracting light, and takes up the coloring material. He found all the lymphatic channels of the tumor abounding in these organisms. He occasionally also observed them lining the walls of the blood-vessels and in connection with the endothelial cells. S.

89. PAYNE and SEMON report the microscopic examination of a tumor removed from a patient suffering from rhino-scleroma. The skin and upper portion of the mucous membrane contained accumulations of small cells, similar to granulation tissue, enclosing some larger cells of various shapes. Concentric cell-accumulations, resembling the epithelial nests in epithelioma, were found in the epidermis. This structure also contained masses of fibrous tissue. The entire microscopic appearance was dissimilar to that of epithelioma, sarcoma, etc., and bore a greater resemblance to that of granulation tumors, leprosy, syphilis-tubercle. Payne, who paid special attention to this point, was not able to discover any organisms in the growth. S.

90. SCHRÖTTER observed a case of congenital bony occlusion of both choanæ in a girl aged nineteen. She presented all the symptoms of complete occlusion of the nose. A rhinoscopic examination showed a complete closure of the choanæ by two diaphragm-like membranes. In transmitted light they presented a very beautiful appearance. Both membranes were perforated by means of the galvanic cautery, and the rest of the tissue was removed with a cutting chisel.

91. SINCLAIR removed a leech from the posterior portion of the nose in a boy aged three. The leech had been two weeks in the nose and gave rise to frequent epistaxis. The boy was accustomed to bathe in muddy water, and this may explain the presence of the animal. S.

92. KOCH removed a piece of orange peel from the nose of a child aged three years, which had suffered for over a year from a

unilateral purulent rhinitis. The respiratory passage had not been entirely occluded on the affected side. Koch again calls attention to the fact that the existence of a unilateral purulent discharge points to the presence of a foreign body.

93. PARKER removed from a a patient the fragments of a gun, which, five years previous, had suddenly exploded, several pieces lodging in the face, near the mouth and nose. The pieces removed consisted of the gun-breech and the ball. The fragments had lodged in the maxillary region, and were removed by dilating a sinus which extended from under the upper lip to the nostril.

94. BABERS'S experience of eighteen cases induces him to advocate the use of the finger-nail in the removal of naso-pharyngeal adenoid vegetations. This may be repeated at several sittings, and renders the use of an anæsthetic unnecessary. He does not deem the use of a sheath to shield the finger from the teeth of the patient as necessary, but finds that a stout buckskin glove, with the end of the index finger slit open, will fully answer the purpose. S.

95. HEYMANN found great benefit from the use of cocaine in naso-pharyngeal operations. After brushing the neighboring mucous membrane with a five-per-cent. solution, he was able to remove nasal polypi and ridges from the septum without producing any pain. It is equally valuable in rendering galvano-caustic operations painless. He has never observed any untoward symptoms following its repeated use. S.

96. SCHNITZLER'S publication treats of numerous therapeutic experiments with cocaine. He found its use extremely beneficial in acute pharyngitis. The previous application of cocaine renders surgical treatment in chronic pharyngitis, also tonsillotomies, entirely painless. It acted efficiently in hyperæsthesia of the soft palate and pharynx, and its application to the larynx, either insufflated as a powder or applied in a solution, greatly facilitated the carrying out of difficult operations. Cocaine produced great alleviation of the distressing symptoms arising in laryngeal tuberculosis, and diminished the reflex irritability occurring in spasmodic cough. Brushing the nasal mucous membrane with a solution of the drug had a decided effect in controlling the attacks of sneezing in coryza Its use rendered the application of galvano-caustic and the removal of polypi entirely painless. The high price of the drug induced the author to seek for a cheaper substitute to answer the same purpose; he found that the extr. alcoh. fol. coca

rec. has the same anæsthetic effect as the salt itself and is much cheaper. S.

97. BABER has observed that soon after brushing the parts with a four-per-cent. solution of cocaine, the lower concha materially diminishes in size. In one instance he noticed a sudden blanching of the membrane. Its previous use greatly facilitates anterior rhinoscopy, and robs the galvano-caustic removal of nasal polypi and subsequent cauterizations of their base of all painful sensations. S.

98. STRAHAN observed that a local application of a four-per-cent. solution of cocaine repeatedly produced an entire disappearance of all the symptoms of coryza. He advocates its use in all acute affections of the upper respiratory tracts. S.

99. PAGET applied pledgets of cotton soaked in a 4-per-cent. solution of cocaine with immediate success in a case of coryza, accompanied by frontal headache, copious epiphora, and occlusion of both nostrils. Three minutes after application these symptoms all disappeared, and he himself had an opportunity to confirm these favorable results on himself while suffering from an acute coryza. S.

100. OWENS praises the use of a weak solution of cocaine applied to the conjuntiva and nasal mucous membrane of patients suffering from hay-fever. S.

101. Among several instruments described by KRAUSE is a nasal tampon carrier for the treatment of ozæna and pharyngitis sicca. It consists of an oval ring fitting exactly in the apertura pyriformis, attached to a bow-shaped arrangement bearing a small rod. The rod has a thread and serves to carry the cotton.

102. Description and illustration of a self-acting tongue depressor, consisting of two metal pieces connected with each other by a back-acting spring. The upper surface of the broader or lingual plate is highly polished to facilitate inspection of the mouth, while its under surface is roughened to prevent it from gliding off the tongue. The smaller or submental plate is curved to adapt itself to the maxillary symphysis. The spring occupies but little space, and, in order that it may not be in the way, has a back action. The instrument depresses the tongue, holds it in position, and is serviceable in minor operations in the mouth. Its use will also facilitate rhinoscopic and laryngoscopic examinations. S.

MISCELLANEOUS NOTES.

DR. WILLIAM BARTLETT DALBY, of London, has received the honor of knighthood.

DR. WEBER-LIEL has resigned the professorship of otology in the University of Jena, and DR. KESSEL, of Graz, Austria, has been appointed in his place.

Fig. I.

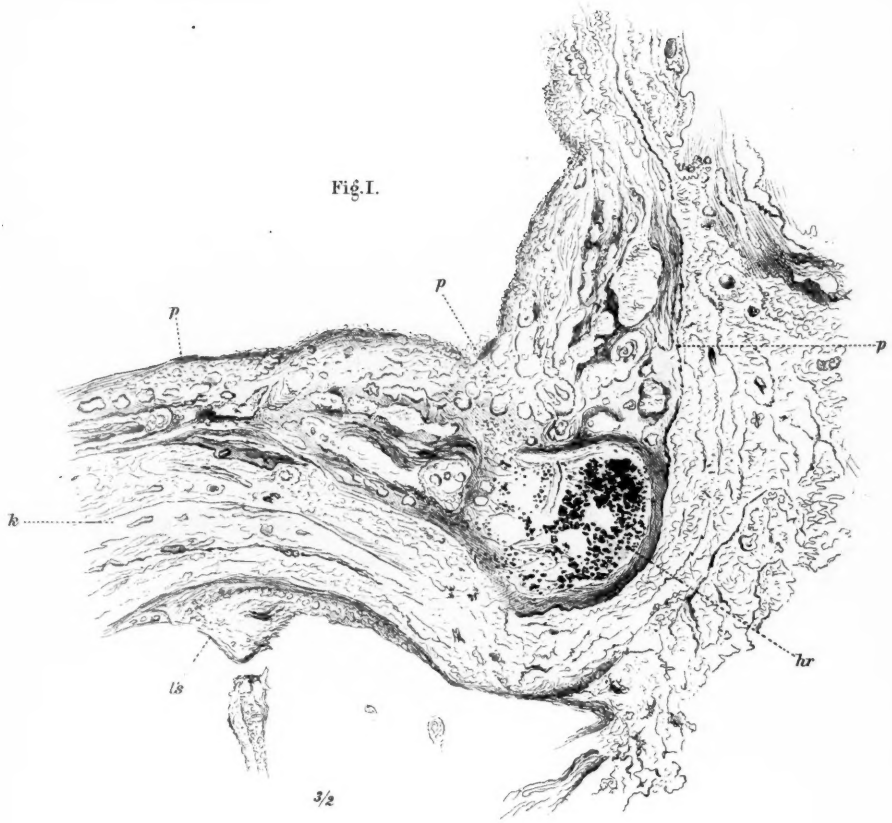
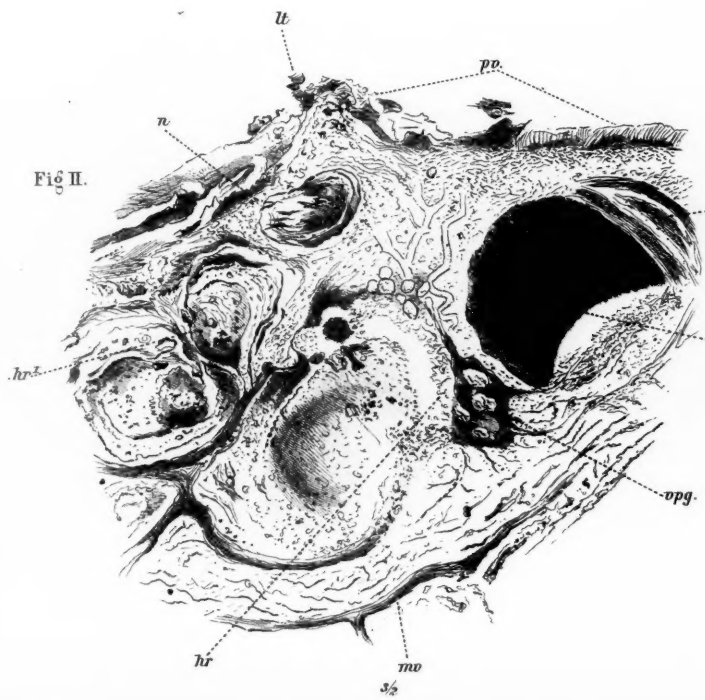


Fig. II.



A. Fratrel gez.

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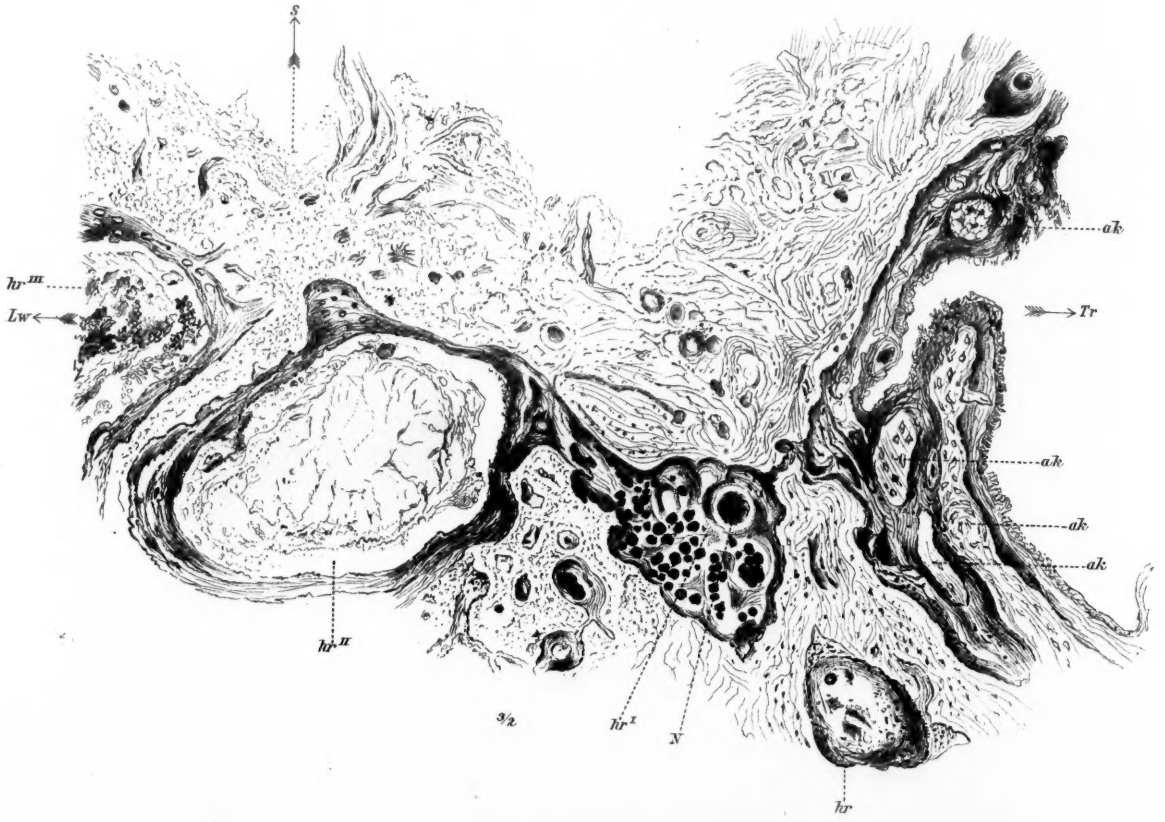
Fig. III.



A. Fratrel. gen.

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